SITE INVESTIGATION TASK WORK PLAN
FOR
STANDARD BRAKE SHOE AND FOUNDRY
AFIN No. 35-00438
PINE BLUFF, JEFFERSON COUNTY, ARKANSAS

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Date

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LIST OF ACRONYMS AND ABBREVIATIONS

ADEQ	Arkansas Department of Environmental Quality
BNA	Base Neutral/Acid Extractable
CLASS	Contract Laboratory Analytical Services Support
EPA	United States Environmental Protection Agency
ESI	Expanded Site Inspection
HASP	Health and Safety Plan
HRS	Hazard Ranking System
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
PA	Preliminary Assessment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAS	Routine Analytical Services
RCRA	Resource Conservation and Recovery Act
SAM	EPA Site Assessment Manager
SAP	Sampling and Analysis Plan
SOW	Statement of Work
TAL	Target Analyte List
TCL	Target Compound List
TDL	Target Distance Limit
TWP	Task Work Plan
USGS	United States Geological Survey

1.0 INTRODUCTION

The Arkansas Department of Environmental Quality (ADEQ), Hazardous Waste Division, has been tasked by the United States Environmental Protection Agency (USEPA) Region 6 to conduct a Site Inspection (SI) at the Standard Brake Shoe and Foundry site in Pine Bluff, Jefferson County, Arkansas. This Task Work Plan (TWP) provides a detailed description of the site and discusses the objectives of the SI sampling strategies and rationale, health and safety guidelines, quality assurance/quality control (QA/QC) procedures, and project team member responsibilities.

The SI is an investigation to collect and analyze environmental samples and other information in the EPA's ongoing screening process of evaluating hazardous waste sites for further action in the Superfund program. The objective of the SI is to define site waste characteristics, contaminant sources, and exposure pathways by collecting and analyzing samples needed to support the Hazard Ranking System (HRS) evaluation process for the site.

To meet the objectives of the SI, ADEQ personnel will: (1) review available information, including analytical data, (2) conduct field work to inspect the site and collect samples, and (3) evaluate all data and prepare the SI report. The pathways of concern for the Standard Brake Shoe and Foundry site are the soil exposure and surface water migration pathways. This SI will build on available file information collected within the ADEQ, Hazardous Waste Division and USEPA Region 6.

This TWP outlines the sequence of tasks and subtasks necessary to conduct a SI at the Standard Brake Shoe and Foundry site. The Sampling and Analysis Plan (SAP) is in Section 5. The

Health and Safety Plan (HASP) is in Section 6. The Quality Assurance Project Plan (QAPP) is in Section 7.

2.0 SITE BACKGROUND

The Standard Brake Shoe and Foundry site location, description, waste characteristics, and concerns are summarized in this section. The site background information presented in this TWP was obtained from information previously compiled by ADEQ and the USEPA Region 6.

2.1 OPERATIONAL HISTORY

The Standard Brake Shoe and Foundry site is located in the city of Pine Bluff in Jefferson County, Arkansas. The site is located at 3200 Pullen Street in the northwest part of Pine Bluff (Figure 1, Figure 2, Figure 3). The land use around the site is a mixture of residential and commercial properties. Due to socio-economic conditions in the general area of the Diaz Intermediates facility, care should be taken to ensure environmental justice.

The Standard Brake Shoe and Foundry site covers a total area of approximately 5.6 acres. The use of the property before being utilized as an industrial site is unknown. A Sanborn Fire Insurance map dated 1920 – 1950 indicates the facility began operation during this time. Three (3) large contiguous buildings, two (2) medium buildings, one (1) above ground storage tank, and four (4) smaller structures are present on the site. The large buildings housed the production areas and the other buildings were apparently used for storage and other associated operations. The site is inactive with no workers present. All equipment and machinery has been removed from the site, the buildings on site are empty. The site is completely fenced with locks on the gates. The site is primarily covered with concrete and asphalt. Areas of bare ground on the site are overgrown with weeds and brush.

Jefferson County

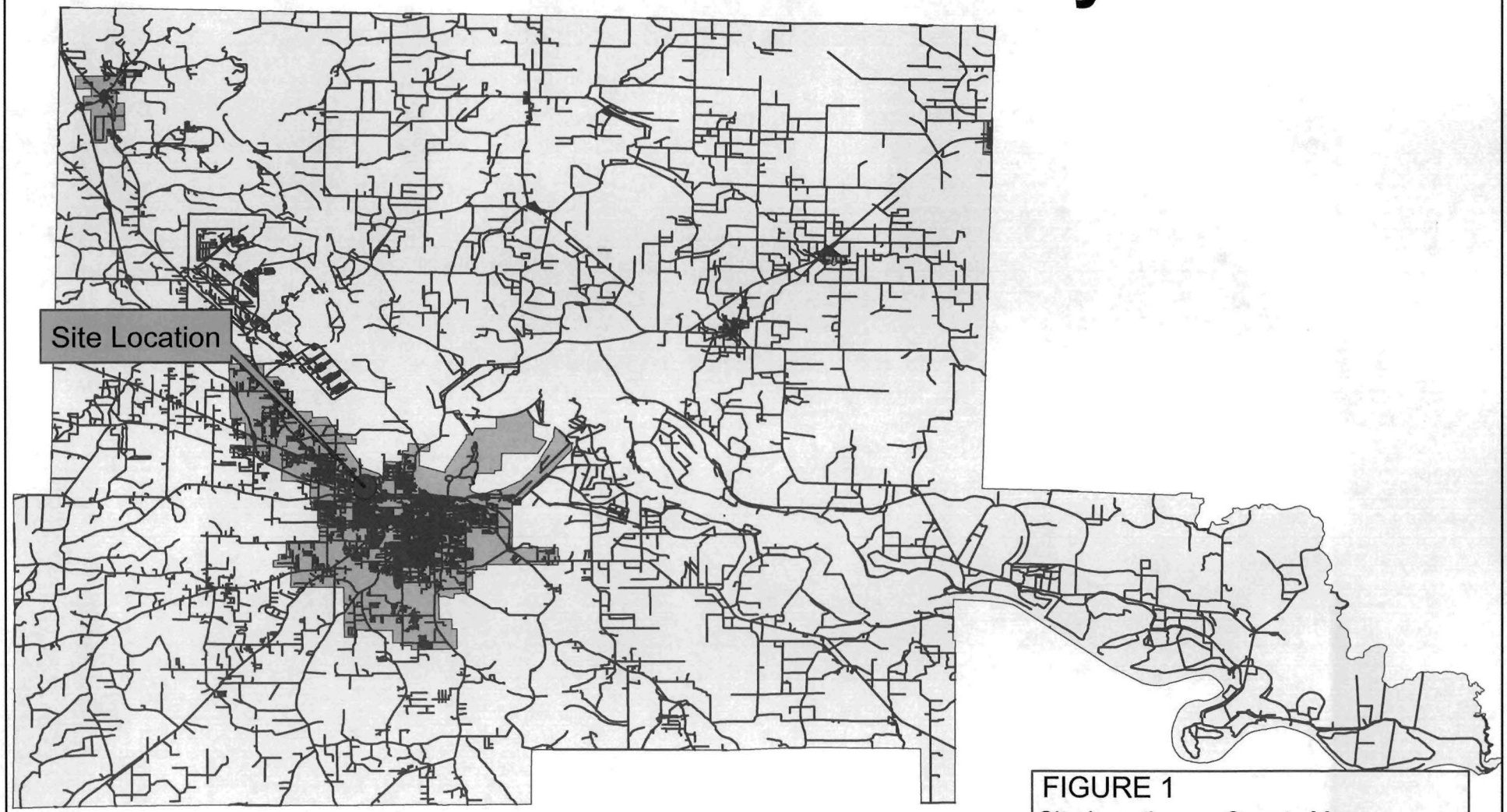

FIGURE 1
Site Location on County Map
Standard Brake Shoe and Foundry
Pine Bluff, Jefferson County, Arkansas

FIGURE 2
Aerial Photograph of Site
Standard Brake Shoe and Foundry
Pine Bluff, Jefferson County, Arkansas

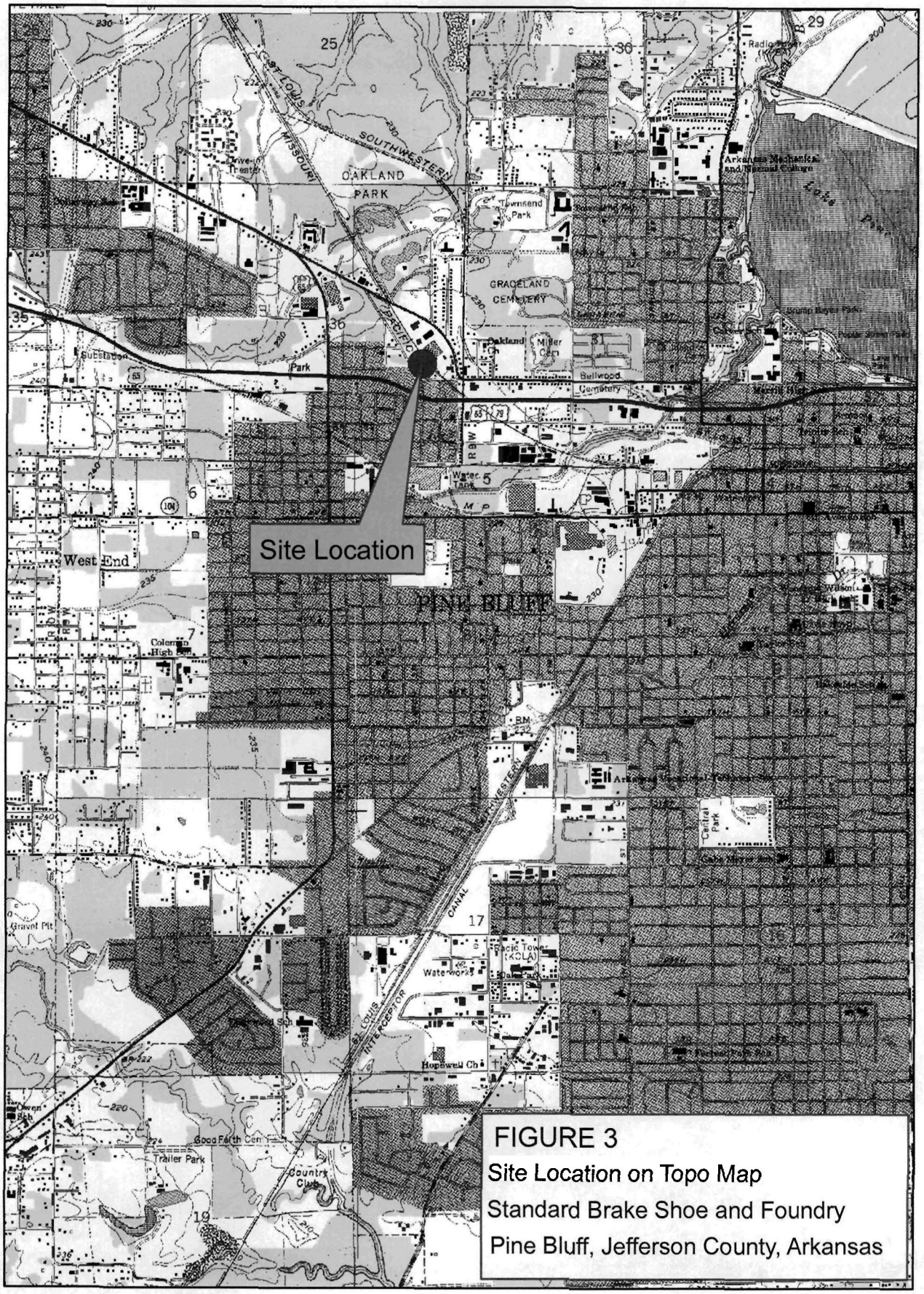

FIGURE 3

Site Location on Topo Map

Standard Brake Shoe and Foundry

Pine Bluff, Jefferson County, Arkansas

According to information obtained from the Jefferson County Real Estate records the Standard Brake Shoe and Foundry site is currently owned by Arkansas Assets, Inc. It is not known when the Standard Brake Shoe and Foundry began operations at the site. In December of 1988, Castings USA, Inc. purchased the property and in February of 1990 the property was reverted back to Standard Brake Shoe and Foundry for dissolution. Acie and Raymond Johnson purchased the site in December of 1991 for the sum of ten dollars. Castings USA, Inc. purchased the property again for the sum of ten dollars in April of 1995 from Acie and Raymond Johnson. Real estate records indicate Arkansas Assets, Inc. purchased the property for the sum of ten dollars in December of 1996 from Castings USA, Inc.

2.2 WASTE CHARACTERISTICS AND REGULATORY INVOLVEMENT

No file information has been found indicating the specific operations that occurred at the site. The only known industrial use for the property has been for the casting and manufacturing of brake shoes. A 1920-1950 Sanborn Fire Insurance map shows the Standard Brake Shoe and Foundry to be in operation at that time. Waste characteristics for operations that occurred on the site are unknown.

3.0 SITE CONDITIONS

Current site and area conditions, including topography, soils, geology, hydrogeology, climatology, meteorology, are characterized in this section.

3.1 TOPOGRAPHY

The Standard Brake Shoe and Foundry site lies within the Delta Region of the Gulf Coastal Plain Physiographic Province. Topography in Jefferson County can be divided into three main areas.

There are rolling uplands, flatwood uplands, and stream flood plains. Slope in the area of the site ranges from zero (0) to three (3) percent.

3.2 SOILS

Surface soils in Jefferson County consist mainly of alluvial sediment deposited by wind and large rivers. Two (2) soil series exist within the area of the site location. These are the Amy-Urban land complex and the Calloway-Urban land complex. The Amy-Urban land complex consists of poorly drained, level Amy soils and Urban land on broad upland flats in the city of Pine Bluff. Amy soils have a surface layer of dark gray-ish brown silt loam about three (3) inches thick. The subsurface layer is gray, mottled silt loam that extends to a depth of about 24 inches. The Calloway-Urban complex consists of somewhat poorly drained, level and nearly level Calloway soils and Urban land that is mainly Calloway soil material. Calloway soils have a surface layer of brown silt loam about six (6) inches thick. The upper part of the sub-soil is yellowish brown, mottled silt loam that extends to a depth of about 21 inches. Urban land consists of soils that have been altered or obscured by buildings or other urban structures. Typical structures are single and multiple-unit dwellings, streets, shopping centers, schools, and parks.

3.3 GEOLOGY

The project area in south central Arkansas is covered by Quaternary Pleistocene alluvium and terrace deposits and underlain by deep sedimentary deposits of the Mississippi Embayment. This area of Arkansas is dominated by Quaternary terrace and alluvial deposits with minor exposures of Tertiary units which underlie the Quaternary age material.

3.4 HYDROGEOLOGY

The principle aquifers in Jefferson County are the Quaternary alluvial deposits near the surface, the upper sands of the Cockfield/Jackson Formation, and the Sparta Sand Formation. Most water use in Jefferson County is from groundwater sources. The Sparta Formation is the major groundwater source for the area. Water quality in the surface Quaternary aquifer is variable and, in some cases, low enough to be undesirable for most uses. In areas near the Arkansas River, where the aquifer is influenced by infiltration from the surface water features, dissolved solids are lower and water quality is better. Water quality in the Cockfield/Jackson aquifer is moderately hard and mineralized, but water from this aquifer is suitable for most uses. Water quality in the Sparta aquifer is excellent. The project area in south central Arkansas is covered by Quaternary Pleistocene alluvium and terrace deposits and underlain by deep sedimentary deposits of the Mississippi Embayment. This area of Arkansas is dominated by Quaternary terrace and alluvial deposits with minor exposures of Tertiary units which underlie the Quaternary age material. Residents in the area of Standard Brake Shoe and Foundry are served by the City of Pine Bluff water system. Public supply water wells for the City of Pine Bluff are reported to be completed in the Sparta aquifer. The Sparta aquifer in this area is reported as being approximately 850 feet below ground surface (bgs).

3.5 CLIMATOLOGY AND METEOROLOGY

The climate in Jefferson County is characterized by hot summers and moderately cool winters. Precipitation is fairly heavy and well distributed throughout the year. The 1990 annual precipitation for Pine Bluff, Arkansas was 71.83 inches.

4.0 PATHWAY ASSESSMENT

The HRS, which is used in screening sites for ranking on the National Priority List (NPL), defines four (4) pathways for hazardous waste migration and exposure. These pathways include the ground water migration pathway, surface water migration pathway, soil exposure pathway and air migration pathway. This section summarizes known information specific to the four (4) exposure pathways at the Standard Brake Shoe and Foundry site.

4.1 GROUND WATER MIGRATION

Groundwater samples will not be collected for the SI since there are no wells located on the property or immediately down gradient of the site. This pathway does not appear to contribute significantly to the overall HRS score since residents of Pine Bluff are served by a municipal water supply.

4.2 SURFACE WATER MIGRATION

Surface water from the site flows in a south/southwesterly direction and empties into Brumps Bayou. Brumps Bayou flows in a north/northeasterly direction before entering Lake Pine Bluff. Surface water discharges from Lake Pine Bluff through Caney Bayou which empties into the Arkansas River for the remainder of the 15-mile Target Distance Limit (TDL) (Figure 4).

Designated uses have been established for streams within 15 miles downstream of the site. These include primary and secondary contact recreation, and perennial and seasonal fisheries. No wetland areas have been identified using USGS 7.5 minute topographic maps within 15 miles downstream of the site within the surface water drainage pathway.

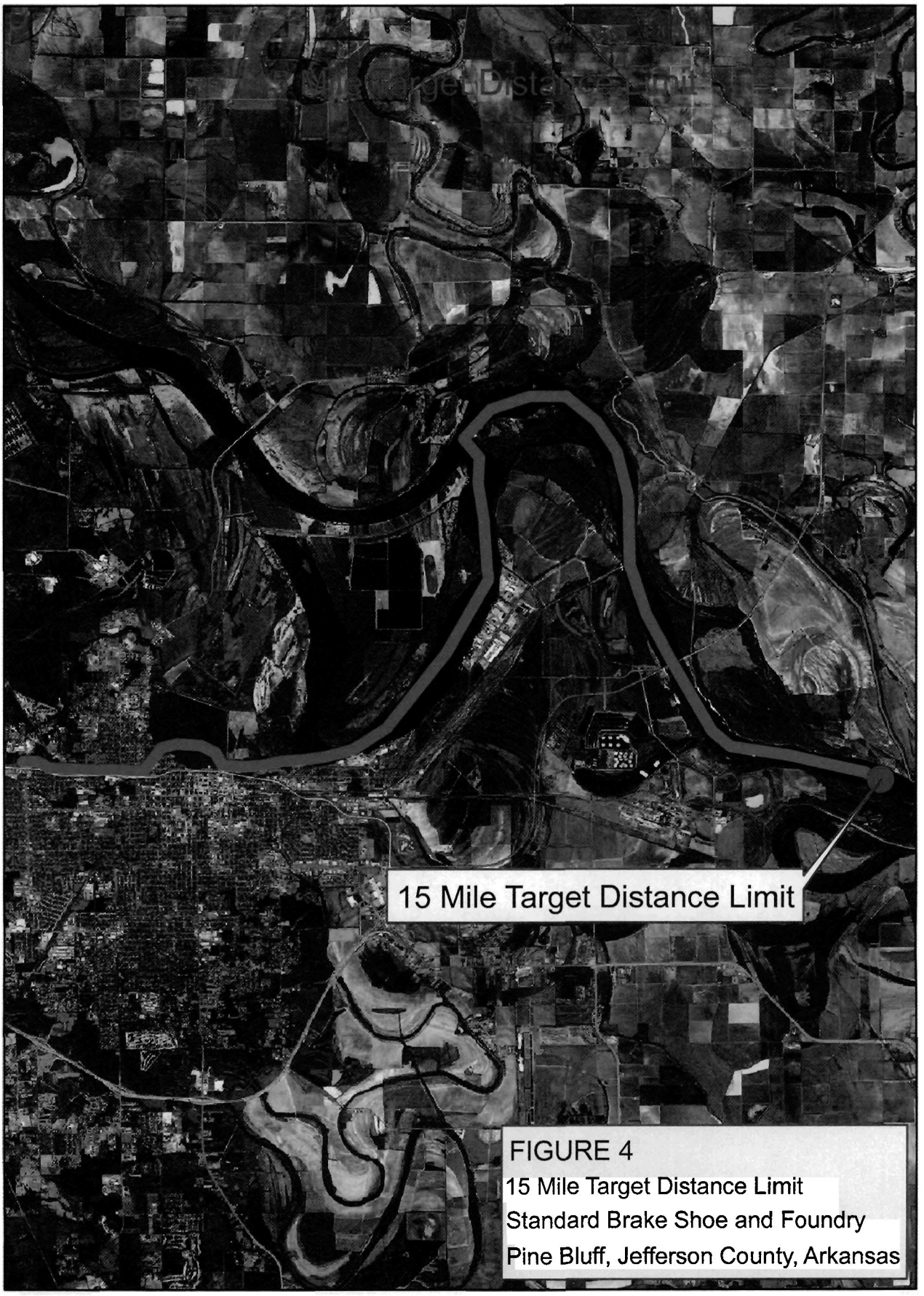

FIGURE 4
15 Mile Target Distance Limit
Standard Brake Shoe and Foundry
Pine Bluff, Jefferson County, Arkansas

The Arkansas Natural Heritage Commission maintains a database on the status and location of elements of special concern in Arkansas. An element of special concern includes sensitive species, natural communities, or colonial bird-nesting sites. There are six (6) elements of special concern within a four (4) mile radius of this referenced location and 51 elements of special concern within a 15-mile radius of this referenced location. One (1) Federally managed area and two (2) State managed areas occur within a 15-mile radius of the site.

4.3 SOIL EXPOSURE

The Standard Brake Shoe and Foundry site is inactive. Standard Brake Shoe and Foundry is located within an area of mixed commercial and residential property. Access to the site is limited, the site is completely fenced with locks on all gates. Access to the site is possible through holes and gaps in the fencing. There are no schools or daycares known to exist within 200 feet of the Site. The Standard Brake Shoe and Foundry site is located in the city of Pine Bluff, Arkansas. The population of Pine Bluff according to 2006 census data is 52,693.

4.4 AIR MIGRATION

Standard Brake Shoe and Foundry is an industrial site with the outside surface areas being primarily covered with concrete, asphalt and vegetation with no apparent dust dispersion. Air samples will not be collected for the SI since this pathway does not appear to contribute significantly to the overall HRS score.

5.0 SAMPLING AND ANALYSIS PLAN

This SAP has been prepared in accordance with methodologies and activities for conducting site inspections outlined in Guidance for Performing Site Inspections Under the Comprehensive

Environmental Response, Compensation, and Liability Act (CERCLA), September 1992. Development of the sampling strategy was based on past operations at the site. The objectives of the field sampling activity are to define site waste characteristics, attribute hazardous substances to site operations, establish representative background levels, and provide sufficient data for the HRS package. The ADEQ sampling team will be responsible for completing the tasks described in this section. The team will conduct all sample collection activities and perform associated field activities. They will also assist in sample documentation, preparation, and shipping. The SI sampling event is scheduled for May 13, 2008.

5.1 ON SITE RECONNAISSANCE

Upon arriving at the Standard Brake Shoe and Foundry site, ADEQ personnel will conduct an on site reconnaissance to familiarize the sampling team with the site (Figure 5). ADEQ personnel will (1) document current site conditions, (2) survey sampling locations, and (3) mark each sampling location for future identification. The ADEQ Project Manager will confirm that the sample locations have been appropriately selected. Alternate or additional sample locations will be selected if proposed locations are inaccessible or a more appropriate sampling location is located. All sampling activities will be documented in a designated bound field logbook. Any deviation from the procedures in the SAP will be documented.

SI sampling activities will occur within and adjacent to the boundaries of the Standard Brake Shoe and Foundry site. Access to private and public areas will be gained in accordance with Arkansas Code Annotated § 8-1-107 et.seq. Attempts will be made to access private property through owners' permission.

Standard Brake Shoe and Foundry

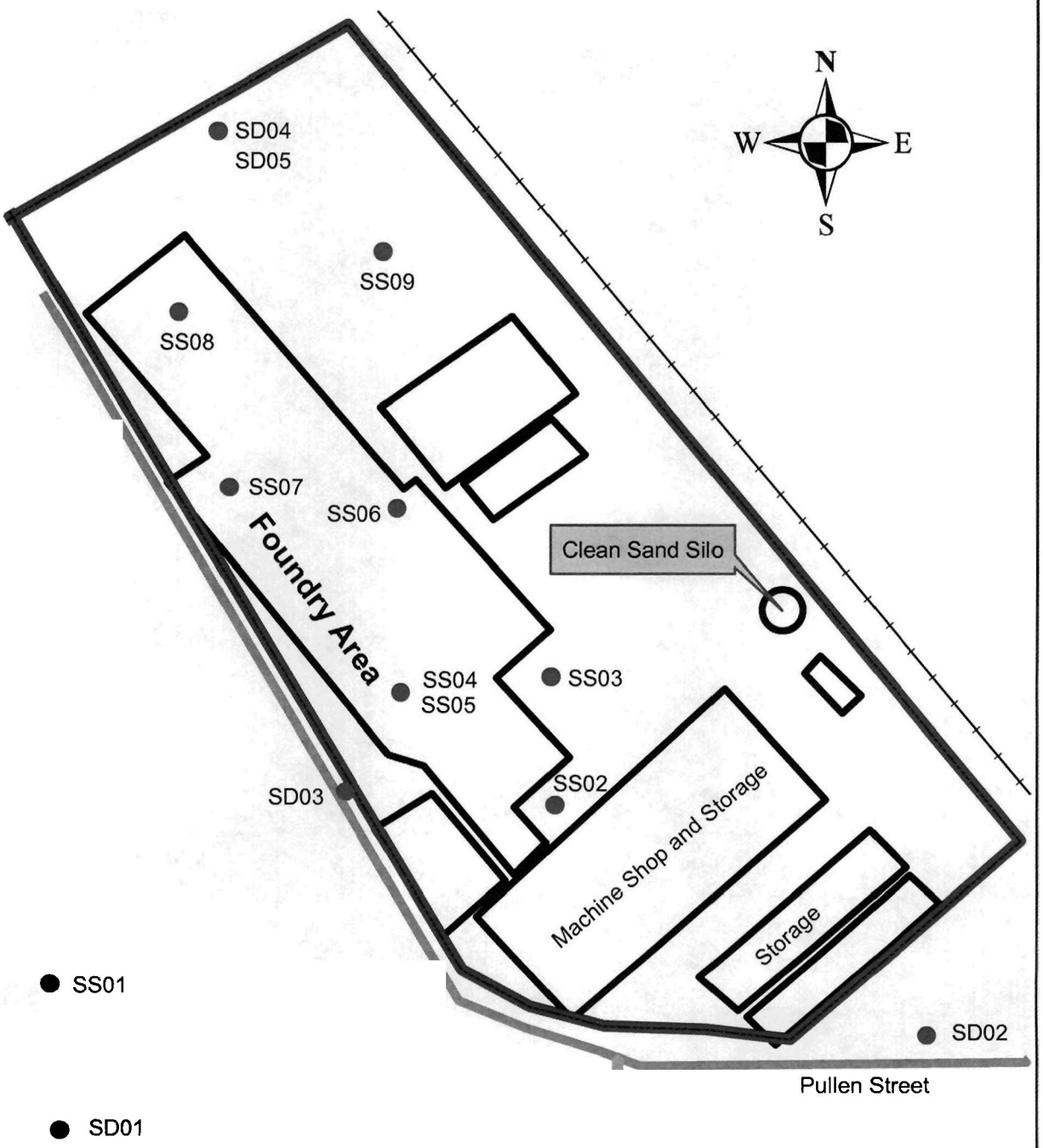

Figure 5
Sample Loaction Map
Standard Brake Shoe and Foundry
Pine Bluff
Jefferson County, Arkansas

Before conducting sampling activities, the ADEQ project manager will conduct a meeting to review the site SAP (Section 5.0) and HASP (Section 6.0) with the sampling team. The ADEQ Project Manager and/or Inspector Supervisor will be authorized to stop any activities that are not in compliance with the SAP or the HASP.

5.2 SAMPLING ACTIVITIES

SI sampling will focus on the soil exposure and surface water migration pathways. On site sampling will define the migration of contaminants, if any, through the soil exposure pathway and into the surface water migration pathway. Off site sampling will define the migration of contaminants, if any, from the site leading into the surface water drainage system. Background samples will be collected to attribute contaminants to site operations. Duplicate and QA/QC samples will also be collected. QA/QC samples will be used to assess the precision, accuracy, representativeness, completeness, and comparability of the analytical laboratory data. Guidelines for collecting QA and QC samples can be found in Data Quality Objectives for Remedial Activities (EPA, 1987).

ADEQ personnel will collect surface soil and sediment samples on site and off site (Figure 5). All samples collected will be analyzed for Target Compound List (TCL) organics (BNA fractions only), Pesticides and PCBs, and Target Analyte List (TAL) metals by the EPA Contract Laboratory Analytical Services Support (CLASS) program in accordance with EPA Routine Analytical Services (RAS) procedures. The procedure to be used by the field sampling team for each sampling activity is described in detail in the following subsections.

ADEQ will collect 14 samples, including duplicate samples, during the SI sampling event. Specific sample locations are shown in Figure 5. Sample locations and rationales are listed in Table 1. Duplicate and QA/QC information is listed in Table 2.

TABLE 1
PA/SI SAMPLE LOCATIONS AND RATIONALE

STATION NUMBER	PROPOSED SAMPLE LOCATION	RATIONALE
SS01	southwest of site, undisturbed area	to evaluate background constituents in the soil exposure pathway
SS02	area of stained soils	to evaluate hazardous constituents in the soil exposure pathway
SS03	area of stained soils	to evaluate hazardous constituents in the soil exposure pathway
SS04	near sump and loading area	to evaluate hazardous constituents in the soil exposure pathway
SS05	duplicate of SS04	to evaluate hazardous constituents in the soil exposure pathway
SS06	stained soils in foundry area	to evaluate hazardous constituents in the soil exposure pathway
SS07	stained soils in foundry area	to evaluate background constituents in the soil exposure pathway
SS08	stained soils in foundry area	to evaluate hazardous constituents in the soil exposure pathway
SS09	slag deposition area	to evaluate background constituents in the surface water pathway
SD01	southwest of site, drainage area	to evaluate background constituents in the surface water pathway
SD02	southeast drainage area	to evaluate hazardous constituents in the surface water pathway
SD03	drainage on the west side	to evaluate hazardous constituents in the surface water pathway
SD04	drainage on the north side	to evaluate hazardous constituents in the surface water pathway
SD05	duplicate of SD04	to evaluate hazardous constituents in the soil exposure pathway

Background samples will be collected from locations representative of site conditions before activities at the Standard Brake Shoe and Foundry site began. Background sample depths will be consistent with surface soil sample depths. The background sample results will be used to determine the concentrations necessary to document Level II contamination. Constituents for analysis, analytical matrices and methods, container types, preservative techniques, and maximum holding times for soil and sediment samples are listed in Table 3.

TABLE 2
SUMMARY OF SAMPLES

Sample Matrix	Number of Samples (a)	Number of Field Duplicates (b)	No. of Lab QA/QC Matrix Samples
Surface Soil (0 to 6 inches)	9	1	1
Surface water sediment (0 to 6 inches)	4	1	1

(a) Number of samples does not include field or laboratory QA/QC samples.

(b) Field duplicate samples are based on a sample frequency of one per 10 samples collected per matrix or concentration level.

TABLE 3
SAMPLE CONTAINER AND PRESERVATION SPECIFICATIONS

Constituent for Analysis	Analytical Matrix	Container Type	Sample Preservation	Holding Time
CLP Extractable Organics	soil/subsoil	8 oz glass	ice	7 days
CLP Pest/PCBs	soil/subsoil	8 oz glass	ice	14 days
CLP Total Metals	soil/subsoil	8 oz glass	ice	180 days
CLP Extractable Organics	sediment	8 oz glass	ice	7 days
CLP Pest/PCBs	sediment	8 oz glass	ice	14 days
CLP Total Metals	sediment	8 oz glass	ice	180 days

Surface soil and sediment samples will be collected using dedicated, pre-sterilized disposable polyethylene scoops. All samples collected will be placed directly into the sampling containers. Excess sample material will be returned to the sample location.

In bound logbooks, the ADEQ field sampling team will document all sampling activities by

using black ink. Each page of the logbook will be dated, numbered, and signed by all individuals making entries. Errors will be corrected by crossing them out with a single line and dating and initialing the entry. The use of correction fluid is not permitted.

For each sample, the location, depth, time, station number, tag number, sample number, and any field observations will be recorded. The location of each sample will be documented with a Trimble Global Positioning System (GPS) unit. Spatial data collected for each sample location will later be plotted on Tiger 95 files or a USGS 7.5 minute topographic map using ESRI Geographic Information System (GIS) computer software. The ADEQ sampling team will also take color photographs of the sample locations to document site conditions and support the observations made in the logbook. Any administrative occurrences, conditions, or activities that affect the field work will also be recorded in the site specific logbook.

5.3 POST SAMPLING ACTIVITIES

After a sample is collected, the ADEQ Project Manager will assure that each sample is properly documented and identified by using the appropriate EPA CLASS tags, seals, and chain-of-custody forms. Filled sample containers will be placed in padded plastic bags, and then placed in coolers. Packaged samples will also be preserved to 4^0 Celsius (C) with double bagged ice.

The appropriate copies of the chain-of-custody forms will be submitted with the samples to the assigned CLASS laboratory. Remaining copies will be submitted to the CLASS sample management officer and EPA Region 6. The documentation records accompanying each cooler will be sealed in a plastic bag and taped securely to the inside of the cooler lid. Each cooler will be labeled with a clearly visible return address. The cooler lids will be secured with strapping

tape that encircles the cooler's ends at least twice. A chain-of-custody seal will be placed at the front left and rear right sides of the cooler so that anyone opening the lid will break the chain-of-custody seals. Custody procedures specified in the CLASS SOW will be followed by the laboratory from the time that the sample is received to the time that the sample is discarded.

The samples will be shipped promptly through Federal Express overnight service to the appropriate CLASS laboratory for analysis. EPA will provide the name and address of these laboratories before the sampling activities begin. CLASS shipping guidelines will be referenced for detailed information on completing this activity. After all appropriate documentation has been completed, the Project Manager will contact Charles Hutchinson at (703) 715-4814 for samples sent to a CLASS laboratory.

ADEQ will collect all investigation-derived waste (IDW) generated and will dispose of it in accordance with Management of Investigation-Derived Wastes During Site Inspections, (USEPA, 1991). These methods include (1) returning the unused portions of surface soil and surface water sediment samples to the sampling location, (2) cleaning personal protective equipment (PPE) and disposable equipment, and (3) eliminating the use of decontamination solvents. After they are cleaned, all disposable protective clothing and equipment (Tyvek suits, booties, gloves) will be collected, double-bagged, and disposed of in accordance with the EPA guidance on IDW.

6.0 HEALTH AND SAFETY PLAN

This HASP was prepared specifically for the SI sampling activities being conducted at the Standard Brake Shoe and Foundry site. This section contains specific health, safety, and

emergency response requirements necessary to perform the SI sampling activities. The purpose of this plan is to provide site and task specific operating procedures that will ensure the health and safety of ADEQ personnel and any official visitors. This plan includes provisions for preventing, responding to, and reporting injuries, illnesses, and environmental emergencies.

Before any field work begins, all field personnel will be briefed on their work assignments and safety procedures contained in this HASP. Each person will have access to a copy of this document and will sign a form (Attachment 1) stating that they have read, understood and will abide by the information presented in this document.

6.1 HAZARD ASSESSMENT

Moderate safety risks are associated with the sampling activities that will be conducted during the SI. Risks include materials handling risks (i.e., lifting, hand and foot injuries) and possible exposure to unknown substances.

6.2 AUTHORITIES AND RESPONSIBILITIES

The key contacts for the USI site:

- EPA Contact
  Mr. Philip Ofosu (6SF-RA)
  Site Assessment Manager
  U.S. EPA, Region 6
  1445 Ross Avenue
  Dallas, Texas 75202-2733
  Telephone No: (214) 665-8332

- ADEQ Contact
  Dennis Green, Inspector Supervisor
  Enforcement and Inspection Branch
  Hazardous Waste Division
  5301 Northshore Drive
  North Little Rock, Arkansas 72118-5317
  Telephone No: (501) 682-0874

- ADEQ Contact
  Mr. Terry Sligh, Project Manager
  Enforcement and Inspection Branch
  Hazardous Waste Division
  5301 Northshore Drive
  North Little Rock, Arkansas 72118-5317
  Telephone No: (501) 682-0853

The Project Manager, Terry Sligh, will be responsible for ensuring that all work performed during the SI sampling event is in accordance with the site HASP, SAP, TWP, and QAPP. The Project Manager and Inspector Supervisor will effectively conduct field activities, enforce disciplinary action when health and safety requirements are not being followed or unsafe practices occur, and oversee work practices to verify they are in accordance with this document. The Project Manager will determine all matters relating to schedule, cost, and personnel assignments that are not safety related.

The Project Manager and/or Inspector Supervisor will be present during all the sampling activities and will be responsible for all health and safety issues. They will be responsible for implementing this document, monitoring compliance with safety and emergency procedures, giving the safety briefing, and insuring that safety and sampling equipment is maintained. The Project Manager is responsible for maintaining a log reflecting potential hazards, exposures, and

implementing control procedures. The Inspector Supervisor has the authority to suspend work activities if the health and safety of the personnel are in danger. The Project Manager will be notified of any suspension of field activities. A safety briefing will be conducted by the Project Manager at the start of each day involving sampling.

6.3 SITE CONTROL

Access to potentially hazardous areas of the site must be controlled to reduce the occurrence of physical injury and chemical exposure to field personnel, visitors, and the public. The following site control measures will be strictly followed at all times.

The Project Manager must ensure that no unofficial visitors enter the area being sampled and discourage official visitors from entering hazardous areas. Official visitors may be permitted to enter the support zone only if they agree to abide by the provisions of the HASP and sign a safety briefing form (Attachment 1). Official visitors must be informed of the potential dangers that could be encountered at this site. If they enter the exclusion zone, they must be accompanied by ADEQ personnel who are trained according to OSHA (29 CFR 1910.120). Official visitors entering the exclusion zone will be expected to wear the appropriate level of protection.

An exclusion zone will be set for site specific areas, if necessary, for completing site work. Only ADEQ personnel and persons authorized by ADEQ personnel will be allowed in this area. No smoking, eating, or drinking will be permitted in this zone.

Any personnel that are not required for specific site tasks being performed in the actual sampling

areas will remain in the support zone. Vehicles, clean equipment, first aid equipment, and portable eyewash station will remain in the support zone unless they are needed in the exclusion zone. If personnel will be working outside of hearing range of another, a tested communication system must exist among all personnel. Voice communication is adequate if all personnel are working within close proximity.

Before initiating field activities, the Project Manager will plan emergency routes and discuss them with all personnel conducting field work for this project. Emergency planning will include establishing an evacuation route from work areas in case of an emergency. The location of the nearest hospital and telephone number will be posted in the support zone throughout the scope of work.

The Jefferson County Regional Medical Center is the nearest hospital to the site. It is located at 1515 W 42nd Pine Bluff, Arkansas (Figure 6). The telephone number for the Jefferson County Regional Medical Center is (870) 541-7100. In addition, 911 should be dialed for all emergencies.

Anyone requiring medical attention will be evacuated immediately from the sampling area. Personnel will not risk their own lives to attempt a rescue if adequate personal protective equipment is not available. Only qualified personnel will give first aid, CPR, or attempt to stabilize an individual. Professional medical assistance will be obtained as soon as possible. These steps will be followed in case of injury:

1. Remove the injured or exposed person from the hazardous area. Stabilize the victim before movement, if possible, particularly in case of neck or back injuries.

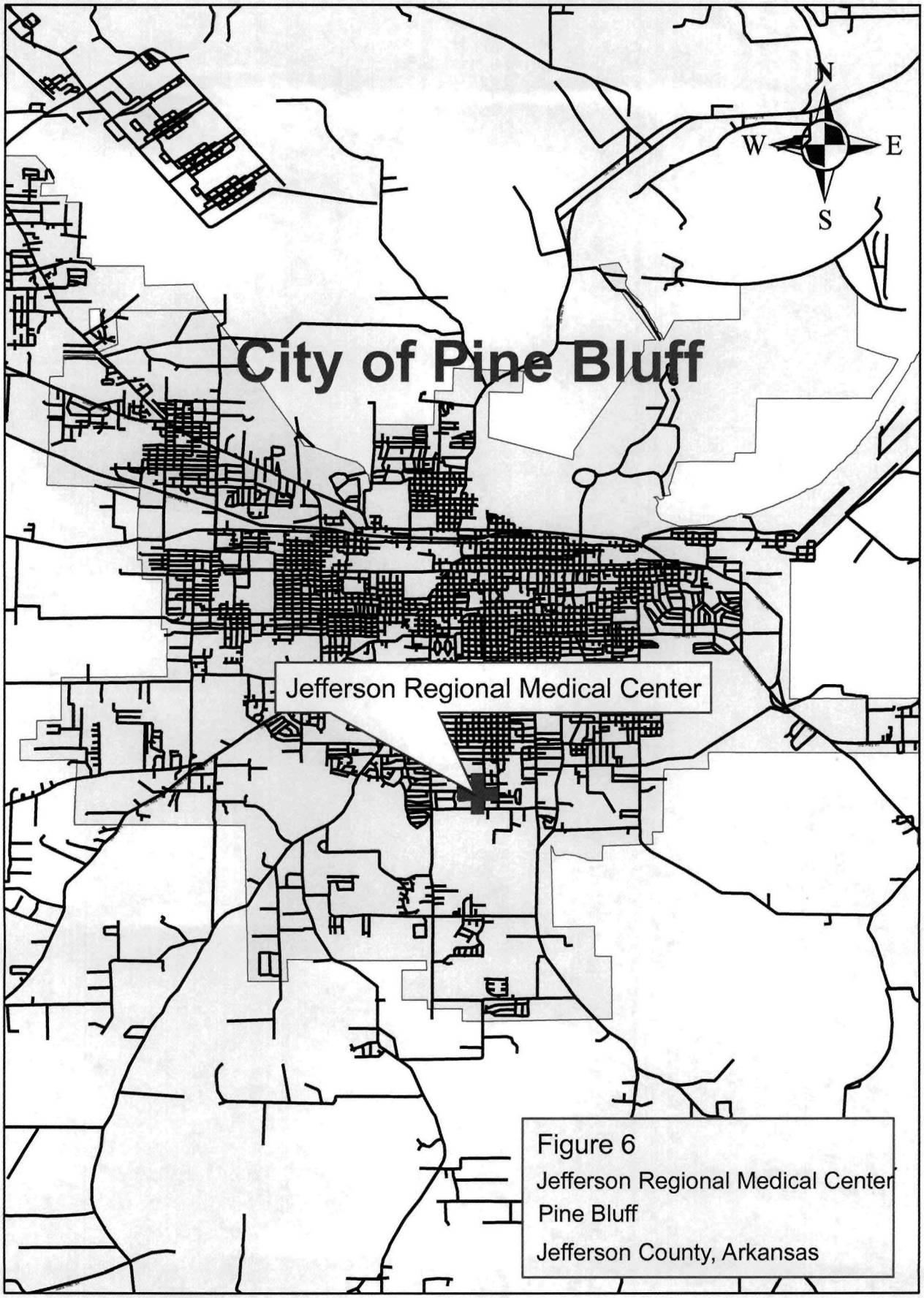

Figure 6
Jefferson Regional Medical Center
Pine Bluff
Jefferson County, Arkansas

2. Perform necessary decontamination of the person to prevent contamination of the personnel performing first aid.

3. Render first aid or CPR if necessary and trained to do so.

4. Perform other necessary decontamination after the affected person is stabilized.

5. Obtain paramedic services or ambulance transport to the hospital. If decontamination could not be completed due to individual injuries, advise medical staff of the type of contamination.

6. Evacuate other personnel in the area until the site is determined safe by the Inspector Supervisor.

7. Contact ADEQ management (Section 6.2) with the details of the incident and corrective actions.

8. Write a report of the incident within 24 hours of the occurrence and submit the report to the Inspector Supervisor.

In addition, the Project Manager will have the following items immediately available to provide assistance to field personnel in case of injury or illness:

1. First aid kit, containing supplies for initial treatment of minor cuts and abrasions, severe lacerations, shock, heat stress, eye injuries, skin irritation, thermal and chemical burns, and immobilization of fractures.

2. Supply of clean water for flooding exposed skin areas or treatment of heat stroke.

3. Soap or hand cleaner and towels.

4. Emergency eyewash.

5. Portable cooler with drinking water and ice.

6.4 PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Sampling activities at the Standard Brake Shoe and Foundry site will be conducted in modified

Level D personal protection. Personnel working within the actual sampling areas will be required to wear long pants, steel-toed rubber boots, safety glasses, and chemical resistant gloves. In the event field conditions change, the level of protection will be upgraded to an appropriate level. All contaminated disposable personal protective equipment and sampling equipment will be placed in containers and disposed of in accordance with Management of Investigation-Derived Wastes During Site Inspections, (USEPA, 1991).

6.5 EMPLOYEE TRAINING REQUIREMENTS

Workers who are delegated responsibilities for work within the sampling areas are required to have:

- 40 Hours of Health and Safety training for hazardous waste sites.
- Three days of supervised field experience on a hazardous waste site.
- Eight hour refresher training within the last 12 months.
- Respirator Fit Test within the last 12 months.

6.6 MEDICAL SURVEILLANCE

All personnel involved in Level D, C, B, or A work activities will have a pre-task medical examination within the past year, including a:

- physical examination
- pulmonary function test
- blood chemistry evaluation
- urine chemistry evaluation
- review of employee occupational and medical history

The purpose of the physical examination is to (1) obtain background blood and urine chemistries, (2) note conditions that could increase susceptibility to heat stress, and (3) determine the ability of personnel to wear respirators. Employees who are clearly unable to perform the required tasks based on medical history and physical examination (i.e., those with lung, heart, liver, or kidney functional impairments) will be prohibited from working in contaminated areas. No individuals will be allowed to work on site wearing contact lenses. Additional medical examinations will be performed whenever there have been actual or suspected exposure to contaminants following injuries or temperature stresses, or upon experience of exposure symptoms. All medical examinations will be performed by an occupational designated or approved physician.

7.0 QUALITY ASSURANCE PROJECT PLAN

This QAPP has been prepared to provide guidance to ADEQ personnel for sampling activities specific to the Standard Brake Shoe and Foundry Site. All QA related issues will be conducted according to EPA Interim Guidance and Specifications for Preparing Quality Assurance Project Plans (U.S. EPA, 1980b). All personnel involved in this sampling event will be required to review the ADEQ Superfund Branch QAPP (Q-TRAK 95-031), which addresses the 16 required elements of a QAPP. The following subsections discuss site specific quality assurance issues.

7.1 QUALITY ASSURANCE OBJECTIVES

The main QA program objective is to provide data that complies with EPA analytical criteria for environmental measurements. Guidelines are found in Test Methods for Evaluating Solid Waste-Physical/Chemical Methods, SW-846 (USEPA, 1982, Second and Third Edition). Strict

chain-of-custody control is required for (1) all samples and records, (2) all data transmissions, reductions, and transcriptions, and (3) all other type of documentation. ADEQ personnel will perform all SI activities in accordance with the ADEQ Quality Assurance Management Plan (QMP). Dennis Green is the Hazardous Waste Inspector Supervisor. Jane Hurley is the ADEQ Quality Assurance (QA) Officer. Terry Sligh is the ADEQ Superfund Project Manager and will oversee quality control (QC) performance for this project. ADEQ Hazardous Waste Division personnel will conduct all field activities at the Standard Brake Shoe and Foundry site.

The ADEQ Project Manager will be responsible for maintaining communication with the ADEQ Hazardous Waste Inspector Supervisor and the QA officer. He will confirm that project activities are performed in accordance with the scope of work specified in the EPA-approved Task Work Plan. He is also responsible for (1) assigning QC coordinators for deliverable products, (2) managing, monitoring, and documenting the quality of all work produced or generated during sampling, and (3) coordinating with the EPA Project Officer. Problems encountered during the assignment activities will be communicated to, and resolved, by Terry Sligh.

Ms. Jane Hurley is the ADEQ QA Officer. She is responsible for independent review, assessment, and consultation within ADEQ and with EPA for all work performed by ADEQ in relation to quality assurance. The QA Officer is responsible for audits and reviews of all work performed. The QA Officer also issues recommendations to the technical staff and management about quality performance. She will also provide recommendations and orders, as required, for corrective action on all aspects of work that do not meet ADEQ and EPA standards. She will

confirm, to the ADEQ project manager, compliance with corrective action orders and recommendations.

7.2 QUALITY ASSURANCE AND QUALITY CONTROL

QC samples will be used to assess the precision, accuracy, representativeness, completeness, and comparability of analytical laboratory data. Guidelines for collecting minimum QA/QC samples are found in Data Quality Objectives for Remedial Response Activities (U.S. EPA, 1987). QA/QC samples will be collected for each medium at the frequency specified in Table 2. Field duplicate samples are collected at specified frequencies and are used to document precision. Field duplicates will be collected by using procedures specified for each medium. The laboratory will be required to analyze interlaboratory split and matrix samples to assure the precision and accuracy of the analytical laboratory instruments, as specified by the CLASS Statement of Work.

For sample data to be considered valid for enforcement purposes, samples must be traceable from the time of collection through chemical analysis and final disposition. EPA has developed CLASS chain-of-custody forms for this purpose. ADEQ will obtain the necessary paperwork from EPA Region 6 and complete the chain-of-custody forms. CLASS sample labeling and shipping guidelines will be referenced for detailed information on completing this activity.

7.3 ANALYTICAL PROCEDURES

The procedures for the chemical analysis of the samples will conform to methods described in Test Methods for Evaluating Solid Waste - Physical/Chemical Methods SW-846 (USEPA,

1982). The CLASS laboratory will be responsible for following the appropriate QA/QC procedures and methodologies to ensure data quality.

7.4 DATA REDUCTION, VALIDATION, AND REPORTING

Data reduction and validation will be performed by the CLASS laboratory in accordance with Contract Laboratory Program Statement of Work for Inorganics Analysis; Multi-Media, Multi-Concentration, (USEPA OERR, 1990), Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods (SW-846) (USEPA 1986), and 40 CFR Part 261, Appendix II. If the analytical data do not meet the minimum data quality objectives, the laboratory will carry out the necessary corrective actions. All data falling outside the QC limits will be flagged by the laboratory.

Validation of all measurement data will be based on adherence to method protocol and the prescribed QC procedures. Data validation forms for organic and inorganic contract laboratory data packages will be completed by CLASS laboratory data validation personnel. These checklists are used to evaluate all of the steps leading to the calculation of the final analytical results, including (1) sample holding times, (2) instrument calibration, (3) blanks, (4) check samples, (5) sample dilutions, (6) precision of duplicate analysis, (7) matrix spike recoveries, and (8) data completeness. All data elements will be qualified as "acceptable," "provisional with problems noted," or "unacceptable," in accordance with EPA data qualifiers. A data summary report will be prepared and submitted to EPA after ADEQ has reviewed the analytical results.

7.5 INTERNAL QUALITY CONTROL CHECKS

QC checks of work assignment activities are performed internally by the Branch Manager, Inspector Supervisor, QA Officer, or a senior technical specialist who has QC experience. The internal QC check includes, at a minimum, the following areas:

- Adequacy of data collection and management procedures
- Adherence to established sampling and collection methods
- Implementation of health and safety procedures
- Compliance with applicable laws and regulations
- Compliance with chain-of-custody procedures

7.6 PERFORMANCE AND SYSTEM AUDITS

Audits are routinely conducted in QA programs to assess and document technical performance. Internal QA audits are based on the audit checklists in Appendix A of EPA's Enforcement Considerations for Evaluation of Uncontrolled Hazardous Waste Disposal Sites by Contractors (U.S. EPA, 1980a). The audit checklists are adapted, as needed, to the specific QA audit. If this is not possible, the QA Officer will develop the checklist.

Upon completion of a QA audit, the program QA Officer submits a report to the Branch Manager and/or Inspector Supervisor. Deficiencies and recommended corrective actions are referred to the Project Manager for immediate action. Any corrective action taken by the Project Manager will be reported, in writing, to the QA Officer, Branch Manager, and Inspector Supervisor.

7.7 CORRECTIVE ACTIONS

An effective QA program requires rapid, effective, and thorough correction of QA problems. Corrective action minimizes the possibility of questionable data or documentation. To provide a complete record of QA activities, all QA problems and corrective actions are documented in writing to the QA Officer. Corrective action is not complete until the problem has been effectively and permanently resolved. The QA Officer will monitor follow-up actions to confirm that the problem does not recur.

Major corrective actions for specific work assignments will be documented and submitted to the Inspector Supervisor. The Inspector Supervisor and Project Manager will jointly define responsibilities for scheduling, performing, and documenting the required action, and for verifying its effectiveness.

7.8 QUALITY ASSURANCE REPORTS TO MANAGEMENT

The Branch Manager, Inspector Supervisor and Project Manager will report to the ADEQ QA Officer and ADEQ's Hazardous Waste Division Chief on the status of any required corrective actions and/or any proposed revisions to the QAPP. QA/QC problems and corrective measures are reported to EPA in accordance with the Quality Assurance Management Staff (QAMS) document (U.S. EPA, 1980b).

REFERENCES

1. Arkansas Department of Environmental Quality, Preliminary Assessment, Standard Brake Shoe and Foundry, Pine Bluff, Jefferson County, Arkansas, September, 2007.

2. Sligh, Terry L., Hazardous Waste Inspector, Arkansas Department of Environmental Quality, Field Logbook #2, page 21.

3. Arkansas Geological Commission, "Geology of Arkansas", Information downloaded from internet site "http://www.state.ar.us/agc/argeol.htm.

4. United States Department of Agriculture, Soil Conservation Service, Soil Survey of Jefferson and Lincoln Counties, Arkansas, 1980.

5. United States Department of Commerce, Climatological Data Annual Summary, Arkansas, Volume 95, November 13, 1990.

6. Arkansas Department of Pollution Control and Ecology, Regulation 2, Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas, April 1998.

7. Osborne, Cindy, Arkansas Natural Heritage Commission, written correspondence with Terry Sligh, Arkansas Department of Environmental Quality, RE: Elements of Special Concern within a 1, 4, and 15-mile radius of Standard Brake Shoe and Foundry.

ATTACHMENT 1

SAFETY BRIEFING DOCUMENTATION FORM

I represent that I have been informed of the hazards associated with performing work at the Standard Brake Shoe and Foundry Site in Pine Bluff, Arkansas. I have also been briefed as to the contents of the Task Work Plan (TWP), specifically Section 6 containing the Health and Safety Plan (HASP). I agree to perform my work in accordance with it.

Name (Print)

_____Signature

Date

ADEQ
Agency

Standard Brake Shoe and Foundry Site, Pine Bluff, Arkansas
Project Name

REFERENCES

REFERENCE 1

ADEQ

A R K A N S A S
Department of Environmental Quality

Certified Letter: 7000 0600 0026 9359 4456

September 21, 2007

USEPA Region 6
Attn: Philip Ofosu (6SF-RA)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Re: Standard Brake Shoe and Foundry (AFIN 35-00438) Preliminary Assessment

Dear Mr. Ofosu:

The Preliminary Assessment (PA) for the Standard Brake Shoe and Foundry site in Pine Bluff, Jefferson County, Arkansas has been completed. Enclosed are two copies of the PA. A Pre-score package has not been included based upon a mutual agreement between ADEQ and EPA.

No observed releases of hazardous substances were encountered during the site inspection. Due to the nature of operations that occurred at the site, the potential for a release of hazardous substances may be present. Heavy metals and also Polychlorinated biphenyls (PCBs) contamination from past operations may exist on site. It is ADEQ's recommendation that further investigation of the site is warranted to determine the need for further action.

Upon your review and approval of this PA, please sign the appropriate pages and return to my attention. This will assist in our tracking and filing procedures.

If you have any questions or require additional information, please contact Dennis Green at (501) 682-0874 or me at (501) 682-0853.

Sincerely,

Terry Sligh
Hazardous Waste Inspector

encl.
cc: Dennis Green, ADEQ
Kathy Gibson, USEPA (6SF-VC)
Project file

PRELIMINARY ASSESSMENT
FOR
STANDARD BRAKE SHOE AND FOUNDRY
AFIN No. 35-00438
PINE BLUFF, JEFFERSON COUNTY, ARKANSAS

Phillip Ofosu
EPA Site Assessment Manager

Date

Melanie Foster

9-21-07

Melanie Foster
Branch Manager

Date

Dennis Green
Inspector Supervisor

9/21/07

Date

Terry Sligh
Inspector
State Project Manager

9-19-07

Date

Table of Contents

1.0 INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986, the Arkansas Department of Environmental Quality (ADEQ), Hazardous Waste Division, conducted a Preliminary Assessment (PA) at the Standard Brake Shoe and Foundry located in Pine Bluff, Jefferson County, Arkansas. The AFIN for the Standard Brake Shoe and Foundry site is 35-00438.

1.1 Project Objectives

The purpose of this assessment was to collect information on the site, assess the threat posed to human health and the environment, and determine the need for additional investigation under CERCLA/SARA or other appropriate action.

1.2 Project Scope

The scope of the investigation included a review of available file information, a comprehensive target survey, and on site and off site reconnaissance.

2.0 SITE BACKGROUND

2.1 Site Location and Setting

The Standard Brake Shoe and Foundry site is located in the city of Pine Bluff in Jefferson County, Arkansas. The site is located at 3200 Pullen Street in the northwest part of Pine Bluff. The land use around the site is a mixture of residential and commercial properties. Environmental justice issues may exist due to the location of the site.

2.2 Site Description

The Standard Brake Shoe and Foundry site covers a total area of approximately 5.6 acres. The use of the property before being utilized as an industrial site is unknown. A Sanborn Fire Insurance map dated 1920 – 1950 indicates the facility began operation during this time. Three (3) large contiguous buildings, two (2) medium buildings, one (1) above ground storage tank, and four (4) smaller structures are present on the site. The large buildings housed the production areas and the other buildings were apparently used for storage and other associated operations. The site is inactive with no workers present. All equipment and machinery has been removed from the site, the buildings on site are empty. The site is completely fenced with locks on the gates. The site is primarily covered with concrete and asphalt. Areas of bare ground on the site are overgrown with weeds and brush.

REFERENCE 2

7/12/07 Standard Brake Shoe and Foundry
3200 Pullen St.
Pine Bluff, AR 71601

Site is primarily covered with asphalt
Oily residue in what appears to house old generators or compressors. 2 areas.
Sand Blasting area with old sand.
Sump located in old warehouse (large)
Area that appear to have held a small furnace
Heat damage to tin in main building
suggest Foundry in large building
roof mounted crane is also present.

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597	336	
585	33	

All equipment & machinery has been removed from the building. All appear to be metal tin construction except for a couple of small brick buildings.
Possible slag pieces noticed on property, no large areas of slag observed. Site has high vegetation in areas not covered by concrete or asphalt. Site is located in a residential, commercial area. Drainage from the site enters road ditches ~~that~~ border the site. Site is fenced and gates are locked. fence has some areas that are cut or down that allow entry.

REFERENCE 3

Arkansas Geological Commission

Stratigraphic Summary of the Arkansas Valley and Ouachita Mountains

The Arkansas Valley is dominated by Pennsylvanian clastic sediments deposited on the margin of a continental shelf primarily by deltas and reorganized in part by marginal marine processes. Structurally the area is made up of broad synclines with relatively narrow intervening anticlines. The axes of these folds generally trend east-west. Most of the observed faulting is normal, but some thrusts faults are noted, associated with the anticlines in the southern part of the province. The synclines are often the most conspicuously present positive topographic features, formed from more rapid erosion of underlying shales, once capping sandstones were breached on the crests and flanks of the surrounding anticlines.

The Ouachita Mountains are made up of complexly folded and faulted Paleozoic age sedimentary rocks that were originally deposited in mostly deep marine environments. The continental collision during the late Paleozoic that pushed up this region produced a structural fabric that trends more or less east-west. The folding was intricate at all scale levels and several local sequences, both complete and partial, are overturned. Compressional faulting is commonly expressed in the sequence throughout the area. The Ouachita province, in a general sense, can be considered an anticlinorum with Late Cambrian and Ordovician deposits being exposed in the center and Mississippian and Pennsylvanian sedimentary units exposed around the margins. The area is cut off to the east by the Gulf Coastal Plain and Mississippi Embayment.

COLLIER SHALE/FORMATION

Age: Late Cambrian Period and Early Ordovician Period
Distribution: West-central Arkansas, Ouachita Mountains (principally Montgomery and Garland Counties); southeastern Oklahoma
Geology: The sequence is composed of gray to black, lustrous shale containing occasional thin beds of dense, black, and intensely fractured chert. An interval of bluish-gray, dense to spary, thin-bedded limestone may be present. Near its top, the limestone is conglomeratic and pelletoidal, in part, with pebbles and cobbles of limestone, chert, meta-arkose, and quartz. The entire unit displays intensive deformation and frequent small quartz veins. Fossils are rare, but include trilobites and conodonts. The base of the formation is not exposed, but the total thickness exposed exceeds 1000 feet.
Original reference: A. H. Purdue, 1909, Geological Society of America Bulletin v. 19, p. 557; A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 31.
Type locality: Named for Collier Creek, Montgomery County, Arkansas

CRYSTAL MOUNTAIN SANDSTONE/FORMATION

Age: Early Ordovician Period
Distribution: West-central Arkansas, Ouachita Mountains (principally Montgomery and Garland Counties); southeastern Oklahoma
Geology: The formation is typically composed of massive, coarse-grained, well-rounded, light-gray sandstone. Lesser amounts of interbedded light-gray to gray shale, black chert, bluish-gray limestone, and gray calcareous conglomeratic sandstone (often containing clasts of meta-arkose) are usually present. Some large boulders of meta-arkose and other exotics occur in some slurried conglomerate intervals. The unit is often set with a network of quartz veins up to several inches thick. In some places the quartz veins are open (up to several feet wide) allowing

Original reference: A. H. Purdue, 1909, Geological Society of America Bulletin v. 19, p. 557; A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 32.
Type locality: Named for the Crystal Mountains, Montgomery County, Arkansas

MAZARN SHALE/FORMATION

Age: Early Ordovician Period
Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma
Geology: The formation is predominantly shale with small amounts of siltstone, silty to conglomeratic sandstone, limestone, and glossy black chert. The shale is mostly gray-black, but thin layers of olive-gray silty shale or siltstone are interbedded with the darker shales in some sequences. When the dark and greenish shales are cleaved at an angle to bedding, they yield a ribboned surface. In many places quartzose siltstone or very fine-grained sandstone is present. Dense, bluish-gray, thin-bedded limestones may be present throughout the interval. Thin to thick beds of gray sandstone are occasionally found at random horizons, notably in the upper and lower portions of the sequence. The cherts are usually found in the upper part of the unit. Milky quartz veins are common in some areas. Only conodonts and a few graptolites have been noted. The unit is conformable with the underlying Crystal Mountain Sandstone. The thickness of the Mazarn Shale ranges from 1000 feet to over 2500 feet.
Original reference: H. D. Miser, 1917, U. S. Geological Survey Bulletin, V. 660, p. 68.
Type locality: Named for Mazarn Creek (headwaters), eastern Montgomery County, northeastern Caddo Gap Quadrangle, Arkansas

BLAKELY SANDSTONE/FORMATION

Age: Middle Ordovician Period
Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma
Geology: The formation consists of black and green shale in alternating layers with hard, gray sandstone and some bluish-gray limestone. Although the shale may locally make up 50 to 75 percent of the sequence, the sandstones appear dominant due to their erosion resistance. The sandstones are light-gray to blue, medium-grained, well-cemented, and in thin to thick beds. Silica or calcite may be present as cement. Where the cement is silica the sandstone is quartzite and is quite resistant to weathering. Erratic meta-arkose boulders and pebbles occur in some conglomeratic sandstones. The shales of the Blakely are sometimes ribboned much like the Mazarn shales. Graptolites and conodonts are the fossils reported from the formation. The lower contact is considered conformable. The thickness ranges from a few feet to about 700 feet.
Original reference: E. O. Ulrich, 1911, Geological Society of America Bulletin, V. 22, p. 676.
Type locality: Named for Blakely Mountain, Garland County, Arkansas

WOMBLE SHALE/ FORMATION

Age: Middle Ordovician Period
Distribution: West-central Arkansas, Ouachita Mountains; southern Oklahoma
Geology: The Womble Formation is mostly black shale with thin layers of limestone, silty sandstone, and some chert. Some green shales are interbedded with the black shales, but less so than in the Mazarn Shale. Cleavage, at an angle to bedding, frequently displays ribboned cleavage surfaces. The sandstones are dark-gray, compact, fine-grained, occasionally conglomeratic, and may be phosphatic. These sandstones are generally present in the lower part of the formation. Dense, blue-gray limestones usually occur near the top of the formation in thin to medium beds. Black chert also is present as thin layers at the top of the formation. Large milky quartz veins often fill fractures in the formation. Graptolite and conodont fossils have been noted from the Womble Shale. The formation rests conformably on the underlying

Arkansas

BIGFORK CHERT/FORMATION

Age: Middle and Late Ordovician Period
Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma
Geology: The Bigfork Chert consists of thin-bedded, dark-gray, cryptocrystalline chert interbedded with varying amounts of black siliceous shale, calcareous siltstone, and dense, bluish-gray limestone. The cherts normally occur in thin to medium beds and are usually highly fractured. The interbedded siliceous shales occur in thin to thick sequences and are often pyritic. Limestones occur mostly as interbeds in the chert and typically weather to soft brown layers. The limestones are more common in the northwestern exposures. Fossils are rare, but fragments of brachiopods, crinoids, sponges, conodonts, and graptolites have been reported. The contact between the Bigfork Chert and the underlying Womble Shale is conformable. The Bigfork in Arkansas ranges in thickness from about 450 feet in the northern Ouachitas to about 750 feet in the southern Ouachitas.
Original reference: A. H. Purdue, 1909, Geological Society of America Bulletin v. 19, p. 557; A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 35.
Type locality: Named for exposures near the Bigfork Post Office, Montgomery County, Arkansas

POLK CREEK SHALE/FORMATION

Age: Late Ordovician Period
Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma
Geology: The Polk Creek rocks are black, sooty, fissile shale with minor black chert and traces of gray quartzite and limestone. Graptolites are common in most of the shales in the formation. The Polk Creek Shale rests conformably on the Bigfork Chert. Its thickness ranges from about 50 to 225 feet.
Original reference: A. H. Purdue, 1909, Geological Society of America Bulletin v. 19, p. 557; A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 36.
Type locality: Named for Polk Creek, Caddo Gap Quadrangle, Montgomery County, Arkansas

BLAYLOCK SANDSTONE/FORMATION

Age: Silurian Period
Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma
Geology: The Blaylock Sandstone consists of fine- to medium-grained sandstone of tan, dark-gray, or greenish color, interbedded with dark-colored to black, fissile shale in the southern Ouachita Mountains. The sandstones are usually thin-bedded, but some intervals consist of fairly thick beds. The sandstones tend toward wackestones with small amounts of plagioclase, zircon, tourmaline, garnet, leucoxene, and mica. The shales, which may dominate thick [illegible] sequences, are usually dark-gray and micaceous. Fossils are rare: only graptolites and a few trace fossils have been reported. The unit rests conformably on the Polk Creek Shale. The formation ranges from as much as 1200 feet thick along the southwestern part of its outcrop area in Arkansas, but thins dramatically to the north where it is frequently represented by only 5 to 20 feet of olive-gray shale.
Original reference: A. H. Purdue, 1909, Geological Society of America Bulletin v. 19, p. 557; A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 37.
Type locality: Named for Blaylock Mountain, Montgomery County, Arkansas

MISSOURI MOUNTAIN SHALE/FORMATION

Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma
Geology: The Missouri Mountain Formation is a shale interbedded with various amounts of conglomerate, novaculite, and sandstone. The shales are usually gray, green, black, or red and weather to buff, green, yellow, or reddish-brown. Conglomerate is normally present at or near the base of the unit and may be up to 4 feet thick. Thin beds of novaculite are present in the upper part of the unit. Thin quartzitic sandstones occur throughout the unit, but are more common in the upper and lower parts. Few identifiable fossils have been found in the Missouri Mountain Shale. The formation rests conformably on the Blaylock Sandstone to the south and on the Polk Creek Shale in the northern part of its outcrop range. It reaches a maximum of about 300 feet in thickness.
Original reference: A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 37.
Type locality: Named for exposures in the Missouri Mountain, Polk and Montgomery Counties, Arkansas

ARKANSAS NOVACULITE FORMATION

Age: Devonian and Early Mississippian Periods
Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma; equivalent novaculite-bearing formation in Texas is the Caballos Novaculite
Geology: Three Divisions of the Arkansas Novaculite Formation are recognized (except in the northern exposures). The Lower Division is a white, massive-bedded novaculite with some interbedded gray shales near its base. The Middle Division consists of greenish to dark gray shales interbedded with many thin beds of dark novaculite. The Upper Division is a white, thick-bedded, often calcareous novaculite. Conodonts and other microfossils are sometimes common in the Arkansas Novaculite. The formation rests conformably on the Missouri Mountain Formation at most places, but the presence of conglomerates in a few places suggests a possible minor incipient submarine disconformity. The formation may attain a thickness of up to 900 feet in its southern outcrops, but thins rapidly to about 60 feet to the north.
Original reference: A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 39-40; (L. S. Griswold, 1892, Arkansas Geological Survey Annual Report 1890, V. 3, p. 57-61, 69, 85, 87-113).
Type locality: Named for quarries in Arkansas (especially near Hot Springs in Garland County) that produced this rock under the trade name of "Arkansas Novaculite"

STANLEY SHALE/FORMATION (GROUP)

Age: Mississippian Period
Distribution: West-central Arkansas, Ouachita Mountains; central southern and southeastern Oklahoma
Geology: The Stanley Shale is composed of dark-gray shale interbedded with fine-grained sandstone. A thick sandstone member, the Hot Springs Sandstone, is found near the base of the sequence and an equivalent thin conglomerate/breccia occurs at the base of the unit in many other places. Stratigraphically minor amounts of tuff, chert, bedded and vein barite, and conglomerate have also been noted in various parts of the sequence. Silty sandstones outside the Hot Springs Sandstone Member are normally found in thin to massive beds separated by thick intervals of shale. The tuffs (Hatton Tuff Lentil and others) seem to be restricted to the lower part of the Stanley Shale. Cherts are sometimes present in the middle and upper parts of the formation. Both plant and invertebrate fossils occur in the Stanley Shale, but the preservation is usually poor. The Hot Springs Sandstone and conglomerate/breccia at the base of the formation possibly indicates a submarine disconformably between the Stanley Shale and the Arkansas Novaculite in Arkansas. The total thickness of the Stanley Formation varies from 3,500 feet to over 10,000 feet. The Hot Springs Sandstone may be as much as 200 feet thick in the area around Hot Springs, but is thinner elsewhere.
Original reference: J. A. Taff, 1902, U. S. Geological Survey Geological Atlas, Folio 79
Type locality: Named for Stanley, Pushmataha County, Oklahoma

JACKFORK SANDSTONE/FORMATION (GROUP)

Age: Pennsylvanian Period, Morrowan Series
Distribution: West-central Arkansas, Ouachita Mountains; southeastern and central southern Oklahoma
Geology: The Jackfork Sandstone is thin- to massive-bedded, fine- to coarse-grained, brown, tan, or bluish-gray quartzitic sandstones with subordinate brown, silty sandstones and gray-black shales. Toward the north of its outcrop area the shale units of the lower and middle Jackfork Sandstone take up more of the section and the sandstones are more lenticular, often occurring as chaotic masses in the shale. Minor conglomerates composed of quartz, chert, and metaquartzite occur notably in the southern exposures of the formation. A few poorly preserved invertebrate and plant fossils have been recovered from the Jackfork Formation. The Jackfork Sandstone rests conformably on the Stanley Shale and varies between 3,500 to 6,000 feet in thickness.
Original reference: J. A. Taff, 1902, U. S. Geological Survey Geological Atlas, Folio 79.
Type locality: Named for Jackfork Mountain, Pittsburg and Pushmataha Counties, Oklahoma

JOHNS VALLEY SHALE/FORMATION

Age: Pennsylvanian Period, Morrowan Series
Distribution: West-central Arkansas, Ouachita Mountains, southern Arkansas River Valley; southeastern Oklahoma
Geology: The Johns Valley Shale is generally a gray-black clay shale with numerous intervals of silty, thin to massive, brownish-gray sandstone. Small amounts of gray-black siliceous shale and chert have also been noted. In the frontal Ouachita Mountains the unit contains large quantities of erratic rocks (limestones, dolostones, cherts, etc.) formed by submarine slumping of older stratigraphic units to the north. The Johns Valley Shale is conformable with the underlying Jackfork Sandstone. Due to the high degree of structural deformation, the total thickness of the unit is difficult to estimate, but it likely exceeds 1,500 feet in thickness.
Original reference: E. O. Ulrich, 1927, Oklahoma Geological Survey Bulletin 45, p. 6, 21-23, 30, 36-37.
Type locality: Named for Johns Valley, Pushmataha County, Oklahoma; exposures in the center of the Tuskahoma syncline (N 1/2, T1S, R16E)

ATOKA FORMATION

Age: Pennsylvanian Period, Atokan Series
Distribution: In Arkansas the Boston Mountains, Arkansas River Valley, and Ouachita Mountains; eastern Oklahoma, eastern New Mexico, and central and western Texas
Geology: The Atoka Formation is a sequence of marine, mostly tan to gray silty sandstones and grayish-black shales. Some rare calcareous beds and siliceous shales are known. This unit has the largest areal extent of any of the Paleozoic formations in the state. It is the surface rock of the Boston Mountains and dominates the exposures in the Arkansas River Valley and the frontal Ouachita Mountains. It is also present in the southern part of the Ouachita Mountains. In the Arkansas River Valley and the frontal Ouachita Mountains, the Atoka Formation has been subdivided into upper, middle, and lower lithic members based on regionally mappable shale or sandstone intervals. The unit locally contains discontinuous streaks of coal and coaly shale in the Boston Mountains and Arkansas River Valley. Fossil plants, generally poorly preserved, are common throughout the section. Poorly preserved invertebrate fossils are much less common than plant fossils, but have been reported from several horizons. Trace fossils are relatively common in the Atoka Formation. The formation is conformable with the Bloyd Shale in the Boston Mountains and with the Johns Valley Shale in the Ouachita Mountains. The unit may be up to 25,000 feet in thickness in the Ouachita Mountains, although only large incomplete sections are known.
Original reference: J. A. Taff and G. I. Adams, 1900, U. S. Geol. Survey 21st Ann. Rept. pt

HARTSHORNE SANDSTONE/FORMATION

Age: Pennsylvanian Period, Desmoinesian Series
Distribution: West-central Arkansas, Arkansas River Valley; eastern Oklahoma
Geology: The Hartshorne Sandstone is a brown to light-gray, massive, frequently cross-bedded, medium-grained sandstone. It is the first continuous sandstone underlying the Lower Hartshorne Coal. The formation is a prominent ledge-former under favorable structural conditions. A few fragmental plant fossils have been noted in the formation. The Hartshorne Sandstone rests with minor unconformity on the Atoka Formation. The unit's thickness ranges from about 10 to 300 feet.
Original reference: J. A. Taff, 1899, U. S. Geol. Survey 19th Ann. Rept., pt. 3, p. 436
Type locality: Named for exposures near Hartshorne, Pittsburg County, Oklahoma

MCALESTER FORMATION

Age: Pennsylvanian Period, Desmoinesian Series
Distribution: Western Arkansas River Valley, Arkansas coal fields; eastern Oklahoma
Geology: The McAlester Formation consists of (in ascending order): several hundred feet of shale with thin sandstone and coal (the Lower Hartshorne Coal is just above the base), several hundred feet of shale with a few sandstone beds and coal (Upper Hartshorne Coal), and capped by several hundred feet of shale with a few coal beds. Plant and a few invertebrate fossils have been reported from several horizons within the formation. The McAlester Formation rests conformably on the Hartshorne Sandstone. The unit ranges from about 500 to 2,300 feet in thickness.
Original reference: J. A. Taff, 1899, U. S. Geol. Survey 19th Ann. Rept., pt. 3, p. 437
Type locality: Named for exposures around McAlester, Pittsburg County, Oklahoma

SAVANNA FORMATION

Age: Pennsylvanian Period, Desmoinesian Series
Distribution: Western Arkansas River Valley; eastern and southern Oklahoma
Geology: The Savanna Formation consists mostly of dark-gray shale and silty shale. It contains minor amounts of light-gray siltstone and medium-gray, very fine- to fine-grained sandstone. On rare occasions, the sandstones may contain rounded, coarse-grained, quartz sand. The beds at the base and top of the section are normally the thickest. At least six coal beds are present in the formation. The unit caps isolated synclinal mountains in the western Arkansas River Valley. Fossils are few, but plant and marine invertebrate faunas have been recovered. The Savanna Formation is conformable with the underlying strata. The Savanna Formation is about 1,600 feet in thickness at its type section, but the top several hundred feet of the sequence is usually missing in Arkansas.
Original reference: J. A. Taff, 1899, U. S. Geol. Survey 19th Ann. Rept., pt. 3, p. 437
Type locality: Named for Savanna, Pittsburg County, Oklahoma

BOGGY FORMATION

Age: Pennsylvanian Period, Desmoinesian Series
Distribution: Generally limited to isolated exposures in the Arkansas River Valley; fairly widespread in central southern and eastern Oklahoma
Geology: Only basal portions of the Boggy Formation are present in Arkansas. It is composed of light-gray, fine- to medium-grained, silty, micaceous sandstone. Typically the sandstones are

Formation. About 225 feet of the lower Boggy Formation are present in Arkansas, but the unit may reach 1,100 feet in thickness in Oklahoma.
Original reference: J. A. Taff, 1899, U. S. Geol. Survey 19th Ann. Rept., pt. 3, p. 438.
Type locality: Named for exposures along North Boggy Creek, Pittsburg and Atoka County, Oklahoma

TERRACE DEPOSITS

Age: Quaternary Period, Pleistocene Epoch
Distribution: Arkansas River valley and significant tributaries
Geology: The terrace deposits include a complex sequence of unconsolidated gravels, sandy gravels, sands, silty sands, silts, clayey silts, and clays. The individual deposits are often lenticular and discontinuous. At least three terrace levels are recognized with the lowest being the youngest. Fossils are rare. The lower contact is unconformable and the thickness is variable.

ALLUVIUM

Age: Quaternary Period, Holocene Epoch
Distribution: Flood plains of the Arkansas River and significant tributaries
Geology: The deposits indicated by this notation are alluvial deposits of present streams. Sediments will include gravels, sands, silts, clays, and mixtures of any and all of these clastic materials. The partition of this unit from other Holocene alluvial deposits was on the basis of geomorphic considerations rather than age or lithology. Fossils are rare and modern. The lower contact is unconformable and the thickness is variable.

Top of Page Stratigraphic summary

REFERENCE 4

SOIL SURVEY OF
Jefferson and Lincoln Counties, Arkansas

United States Department of Agriculture
Soil Conservation Service

In cooperation with
Arkansas Agricultural Experiment Station

ties in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Soil descriptions and potentials

1—Amy silt loam. This poorly drained, level soil is on broad flats on uplands. Slope is less than 1 percent. Individual areas range from about 20 to 500 acres.

Typically, the surface layer is dark grayish brown silt loam about 3 inches thick. The subsurface layer is gray, mottled silt loam that extends to a depth of about 24 inches. The upper part of the subsoil is gray, mottled silty clay loam that extends to a depth of about 40 inches. The lower part is light brownish gray silt loam that has mottles of brown or gray and that extends to a depth of about 56 inches. The underlying material is gray, mottled silty clay loam that extends to a depth of more than 72 inches.

Included with this soil in mapping are small areas of Savannah and Pheba soils, which make up less than 10 percent of this unit. Also included are a few small areas of soils that have a subsoil of sandy clay loam.

This soil is low in natural fertility. The surface layer and subsoil are strongly acid or very strongly acid. Permeability and runoff are slow. Available water capacity is high. The water table is seasonally high; it is within 12 inches of the surface during winter and early spring.

Most of the soil is wooded, and most cleared areas are pasture. Adapted pasture plants are bermudagrass, bahiagrass, tall fescue, dallisgrass, annual lespedeza, white clover, and sericea lespedeza. Lime and fertilizer improve stand and yields. Suitable crops include soybeans and winter small grains where surface drainage is adequate.

This soil has high potential for loblolly pine and sweetgum. Wetness is the main limitation to equipment use in managing and harvesting the tree crop, but this is usually overcome by logging during the drier seasons.

This soil has low potential for most urban uses. Poor drainage and the seasonal high water table are severe limitations for dwellings, streets, and industrial sites. The slow permeability and the seasonal high water table are severe limitations for septic tank absorption fields. These limitations are difficult or impractical to overcome. Capability unit IIIw-1; woodland suitability group 2w9.

2—Amy soils, frequently flooded. This undifferentiated group consists of level, poorly drained soils on flood plains of local drainageways. The soils are flooded two or three times each year. The undifferentiated group of Amy silt loam intermingled in an irregular pattern with Amy soils that have variable surface texture. Individual areas are large enough to map separately, but because of present and predicted use, they were not separated in mapping. Most mapped areas contain the Amy soils that have variable surface texture, but Amy silt loam was mapped in a few areas. Slope is less than 1 percent. Individual areas range from 20 to 50 acres.

Typically, the surface layer is dark grayish brown silt loam about 3 inches thick. The subsurface layer is mottled silt loam that extends to a depth of about 24 inches. The upper part of the subsoil is gray, mottled silty clay loam that extends to a depth of about 40 inches. The lower part is light brownish gray silt loam that has mottles of brown or gray and that extends to a depth of about 56 inches. The underlying material is gray, mottled silty clay loam that extends to a depth of more than 72 inches.

Included with this soil in mapping were small areas of Ouachita soils. These areas make up less than 10 percent of this mapping unit.

These soils are low in natural fertility. The surface layer and subsoil are strongly acid or very strongly acid. Permeability and runoff are slow. Available water capacity is high. The water table is seasonally high, and flooding is frequent during winter and spring.

This undifferentiated group has low potential for cultivated crops because of the hazard of frequent flooding. In most years the flooding occurs during the period of December to June. Most of the area is used for woodland and wildlife.

This undifferentiated group has high potential for loblolly pine, sweetgum, and water oak. Wetness and flooding limit the use of equipment in managing and harvesting the tree crop, but this can be overcome by using special equipment and by logging during drier seasons.

The soils in this undifferentiated group have very low potential for urban uses. Wetness and flooding are the main limitations, and they can be overcome only by major flood control and drainage measures. Capability unit Vw-1; woodland suitability group 2w9.

3—Amy-Urban land complex. This complex consists of poorly drained, level Amy soils and Urban land on broad upland flats in the city of Pine Bluff. Slope is less than percent. Individual areas range from 20 to 800 acres.

Amy soils make up about 25 to 75 percent of this mapping unit, Urban land makes up about 20 to 65 percent, and other soils make up about 5 to 10 percent. The areas are so intricately mixed that it is not feasible to separate them at the mapping scale for this survey.

Typically, Amy soils have a surface layer of dark grayish brown silt loam about 3 inches thick. The subsurface layer is gray, mottled silt loam that extends to a depth of about 24 inches. The upper part of the subsoil is gray, mottled silty clay loam that extends to a depth of about 40 inches. The lower part is light brownish gray silt loam that has mottles of brown and gray and that extends to a depth of about 56 inches. The underlying material is gray, mottled silty clay loam that extends to a depth of more than 72 inches.

Urban land consists of soils that have been altered or obscured by buildings or other urban structures; therefore, classification of the soils is impractical. Typical structures are single and multiple-unit dwellings, streets, shopping centers less than 40 acres in size, schools, and parks. Areas of Amy soils and other soils that have been

altered by cutting, grading, and filling make up some Urban land. In some areas, the soil has not been altered but is covered by 6 to 24 inches of loamy material.

Included in this complex in mapping are small areas of Savannah, Calloway, and Pheba soils and small areas of soils that are frequently flooded. These soils have been altered in some places.

The Amy soil is low in natural fertility. The surface layer and subsoil are strongly acid to very strongly acid. Permeability and runoff are slow. Available water capacity is high. The water table is seasonally high; it is within 12 inches of the surface during the winter and early spring.

This complex has low potential for most urban uses. The seasonal high water table and poor drainage are severe limitations for dwellings, streets, and industrial sites. The slow permeability and the seasonal high water table are severe limitations for septic tank absorption fields. These limitations are difficult to overcome. Landscaping plants that will tolerate a high content of water in the soil can be selected for planting. Wetness is the main limitation to equipment use for planting and maintaining lawns, shrubs, and trees. This limitation is usually overcome by planting during drier seasons. Not assigned to a capability unit or a woodland suitability group.

4—Calloway silt loam, 0 to 1 percent slopes. This somewhat poorly drained, level soil is in smoother areas of the loessial plains. Individual areas are 10 to 100 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil is yellowish brown, mottled silt loam that extends to a depth of about 21 inches. Below this is a firm, brittle fragipan. It is light yellowish brown, mottled silt loam that is compact and brittle to a depth of 37 inches; yellowish brown, mottled silt loam that is compact and brittle to a depth of 51 inches; and yellowish brown and grayish brown, mottled silt loam that is compact and brittle and that extends to a depth of 75 inches or more.

Included with this soil in mapping are a few intermingled areas of Grenada and Henry soils. The included soils make up less than 10 percent of this mapping unit.

This soil is moderate in natural fertility. It is strongly acid throughout except the surface layer in limed areas. Permeability is slow, and available water capacity is medium. Tilth is easy to maintain. The water table is perched above the fragipan during periods of high rainfall. The fragipan restricts penetration of roots.

This soil has medium potential for farming. The main crops are cotton, rice, and soybeans. Other suitable crops are corn and grain sorghum. Adapted pasture plants are bermudagrass, bahiagrass, and tall fescue. Crops on this soil respond well to fertilization, and tilth is easy to maintain. Farming operations are commonly delayed a few days after a rain because of excess water, and surface drains are needed.

This soil has medium potential for loblolly pine, cherrybark oak, sweetgum, and water oak. Wetness is the main limitation to equipment use in managing and harvesting the tree crop, but this is usually overcome logging during the drier seasons.

This soil has low potential for most urban uses. W ness is a severe limitation for dwellings and indus sites. Wetness and shrink-swell potential are se limitations for streets. Slow permeability and wetnes severe limitations for septic tank absorption fields. T limitations are difficult or impractical to overcome. C bility unit IIw-1; woodland suitability group 3w8.

5—Calloway silt loam, 1 to 3 percent slopes. somewhat poorly drained, nearly level soil is in smoo areas of the loessial plains. Individual areas are 10 t acres.

Typically, the surface layer is brown silt loam abo inches thick. The upper part of the subsoil is yello brown, mottled silt loam that extends to a depth of ab 21 inches. Below this is a firm, brittle fragipan. It is l yellowish brown, mottled silt loam that is compact brittle to a depth of 37 inches; yellowish brown, mott silt loam that is compact and brittle to a depth of inches; and yellowish brown and grayish brown, mott silt loam that is compact and brittle and that extends t depth of 75 inches or more.

Included with this soil in mapping are a few interm gled areas of Grenada and Henry soils. The included s make up less than 10 percent of this mapping unit.

This soil is moderate in natural fertility. It is stron acid throughout except for the surface layer in lim areas. Permeability is slow, and available water capac is medium. Tilth is easy to maintain. The water table perched above the fragipan during periods of high ra fall. The fragipan restricts penetration of roots.

This soil has medium potential for farming. The m crops are cotton and soybeans. Other suitable crops corn and grain sorghum. Adapted pasture plants bermudagrass (fig. 1), bahiagrass, and tall fescue. The responds well to fertilization, and tilth is easy to maint Erosion is a moderate hazard if cultivated crops grown. Minimum tillage, contour farming, and the use cover crops help reduce runoff and control erosion. Far ing operations are commonly delayed a few days afte rain because of poor internal drainage.

This soil has medium potential for loblolly pine, ch rybark oak, sweetgum, and water oak. Wetness is main limitation to equipment use in harvesting the t crop, but this is usually overcome by logging during drier seasons.

This soil has low potential for most urban uses. W ness is a severe limitation for dwellings and indust sites. Wetness and shrink-swell potential are sev limitations for streets. Slow permeability and wetness severe limitations for septic tank absorption fields. Th limitations are difficult or impractical to overcome. Ca bility unit IIe-1; woodland suitability group 3w8.

6—Calloway-Urban land complex. This complex c sists of somewhat poorly drained, level and nearly le Calloway soils and Urban land that is mainly Callov soil material. It is in the city of Pine Bluff. Slope ran

from 0 to 3 percent. Most areas range from about 20 to 200 acres.

Calloway soils make up 25 to 65 percent of this mapping unit, Urban land makes up about 25 to 70 percent, and other soils make up about 5 to 10 percent. The areas are so intricately mixed that it is not feasible to separate them at the mapping scale for this survey.

Typically, Calloway soils have a surface layer of brown silt loam about 6 inches thick. The upper part of the subsoil is yellowish brown, mottled silt loam that extends to a depth of about 21 inches. Below this is a firm, brittle fragipan. It is light yellowish brown, mottled silt loam that is compact and brittle and that extends to a depth of 37 inches; yellowish brown, mottled silt loam that is compact and brittle and that extends to a depth of 51 inches; and yellowish brown and grayish brown, mottled silt loam that is compact and brittle and that extends to a depth of 75 inches or more.

Urban land consists of soils that have been altered or obscured by buildings or other urban structures; therefore, classification of the soils is impractical. Typical structures are single and multiple-unit dwellings, streets, parking lots, shopping centers less than 40 acres in size, and industrial sites. Areas of Calloway soils and other soils that have been altered by cutting, grading, and filling make up Urban land. In some areas, the soil has not been altered but is covered by 6 to 24 inches of loamy material.

Included with this complex in mapping are a few intermingled areas of Grenada-Urban land complex and Henry-Urban land complex. These soils have been altered in some places.

Calloway soils are moderate in natural fertility. They are strongly acid throughout except the surface layer in limed areas. Permeability is slow, and available water capacity is high. Tilth is easy to maintain. The water table is perched above the fragipan during periods of high rainfall. The fragipan restricts penetration of roots.

This complex has low potential for most urban uses. Wetness is a severe limitation for dwellings and industrial sites. Wetness and shrink-swell potential are severe limitations for streets. Slow permeability and wetness are severe limitations for septic tank absorption fields. These limitations are difficult or impractical to overcome. Landscaping plants that will tolerate a high content of water in the soil can be selected for planting. Wetness is the main limitation to equipment use for planting and maintaining lawns, shrubs, and trees. This limitation can be overcome by planting during drier seasons. Not assigned to a capability unit or a woodland suitability group.

7—Caspiana silt loam, 0 to 1 percent slopes. This well drained, level soil is on low terraces and natural levees. Slope is less than 1 percent. Individual areas range from about 20 to 300 acres.

Typically, the surface layer is dark brown silt loam about 5 inches thick. The subsoil extends to a depth of 36 inches. The upper part is very dark grayish brown silt loam, and the middle and lower parts are brown silt loam. This is underlain with brown very fine sandy loam that extends to a depth of 50 inches and stratified brown and yellowish red silt loam and silty clay loam that extend to a depth of 68 inches or more.

Included with this soil in mapping are small areas of Rilla, Hebert, Perry, Roxana, and Coushatta soils. Also included are a few small areas of soils that have a slope of as much as 3 percent, small areas of soils that have a lighter colored surface layer, and areas of soils that have gray mottles in the subsoil. These included soils make up less than 10 percent of the unit.

This soil is high in natural fertility. Reaction ranges from medium acid to moderately alkaline in the A and B horizons. Permeability is moderate, and available water capacity is high.

This soil has high potential for row crops and small grains. It warms up early in spring and permits early planting. The main crops are cotton and soybeans. Other suitable crops are grain sorghum and winter small grains. Adapted pasture plants are bermudagrass and tall fescue. Crops on this soil respond well to fertilization, and tilth is easy to maintain.

This soil has high potential for eastern cottonwood, sweetgum, and American sycamore.

This soil has medium potential for most urban uses. Shrink-swell potential and low strength are moderate limitations for dwellings, light industrial buildings and streets. Permeability is a moderate limitation for septic tank filter fields. These limitations are difficult to overcome. Capability unit I-1; woodland suitability group 2o4.

8—Coushatta silt loam. This well drained, level soil is on natural levees of bottom lands of the Arkansas River. Slope is 0 to 1 percent. Individual areas range from about 20 to 100 acres.

Typically the surface layer is dark brown silt loam about 8 inches thick. The upper part of the subsoil is reddish brown silt loam that extends to a depth of about 15 inches, and the lower part is reddish brown silty clay loam that extends to a depth of about 30 inches. The underlying material is reddish brown very fine sandy loam over dark reddish brown silty clay loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Desha, Roxana, Oklared, and Crevasse soils. These included soils make up less than 10 percent of the mapping unit. Also included are a few small areas of soils that have a dark brown subsoil and areas of soils where a buried horizon is below a depth of 40 inches.

This soil is high in natural fertility. The surface layer is slightly acid to mildly alkaline. Permeability is moderate, and runoff is slow. Available water capacity is high.

This soil has high potential for row crops and small grain. The main crops are cotton, soybeans (fig. 2), and wheat. This soil warms early in spring and permits early planting. Tilth is easy to maintain. The soil can be cultivated over a wide range of moisture conditions. With good management, clean-tilled crops that leave large amounts of residue can be grown year after year.

REFERENCE 5

ISSN 0364-605X

CLIMATOLOGICAL DATA
ANNUAL SUMMARY

ARKANSAS

1990

VOLUME 95 NUMBER 13

"I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHER ADMINISTRATION (NOAA). IT IS COMPILED USING INFORMATION FROM WEATHER OBSERVING SIT SUPERVISED BY NOAA/NATIONAL WEATHER SERVICE AND RECEIVED AT THE NATIONAL CLIMATIC D CENTER (NCDC), ASHEVILLE, NORTH CAROLINA 28801."

Kenneth D Hadley

DIRECTOR
NATIONAL CLIMATIC DATA CENTER

TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL (INCHES)

STATION	JAN		B		R		APR		MAY		JUN	
	PRE IP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE
PINE BLUFF	6.35	1.97	7.55	3.21	7.87	2.78	7.40	2.20	6.72	1.09	1.95	-1.10
PORTLAND	7.06		8.14		9.27		5.39		4.67		1.65	
ROHWER 2 NNE	6.87		9.69		10.12		4.35		6.31		3.50	
STAR CITY	6.88											
--DIVISIONAL DATA--- >	7.53	2.74	9.00	4.54	10.18	4.77	5.54	11	6.70	1.48	2.29	-1.09

SEE REFERENCE NOTES FOLLOWING STATION INDEX

TOTAL PRECIPITATION AND DEPARTURES FROM NORMAL (INCHES)

STATION	JUL		AUG		SEP		OCT		NOV		DEC		ANNUAL	
	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE	PRECIP.	DEPARTURE
NE BLUFF	2.34	-1.28	3.29	.21	3.66	-.13	12.41	9.24	4.33	.20	7.88	3.16	71.83	21.55
RTLAND	1.69		1.85		3.77		5.44		4.96		M 9.08		M 62.97	
HWER 2 NNE	1.23		1.12		3.72		4.93		4.50		13.38		69.72	
IR CITY														
DIVISIONAL DATA------->	1.44	-2.76	2.85	-.20	2.84	-.87	6.20	3.43	4.84	.44	9.17	4.40	68.58	17.07

SEE REFERENCE NOTES FOLLOWING STATION INDEX

REFERENCE 6

Arkansas Pollution Control and Ecology Commission

Regulation 2

Regulation Establishing
Water Quality Standards for Surface Waters
of the State of Arkansas

January 26, 2001

DESIGNATED USES: GULF COASTAL ECOREGION

(Plates GC-1, GC-2, GC-3, GC-4)

Extraordinary Resource Waters
Saline River (GC-3, GC-4)
Moro Creek - adjacent to natural area (GC-3)

Natural and Scenic Waterways
Saline River from the Grant-Saline County line to mouth (GC-3)

Ecologically Sensitive Waterbodies
Little River above Millwood Reservoir - location of Ouachita rock pocketbook and pink mucket mussels (GC-1)
Grassy Lake and Yellow Creek below Millwood Reservoir - unique ecosystem and biota (GC-1)
Lower Little Missouri River - location of peppered shiner and longnose darter (GC-2)
Lower Saline River - location of peppered shiner, crystal darter and goldstripe darter (GC-3)
Ouachita River near Arkadelphia - location of flat floater, Ouachita rock pocketbook and pink mucket mussels (GC-2)

Streams with Substantial Springwater Influence
L'Eau Frais (GC-4)
Cypress Creek (GC-4)
East and West Fork Tulip Creeks (GC-4)
Others to be determined

Primary Contact Recreation - all streams with watersheds greater than 10 mi² and all lakes/reservoirs

Secondary Contact Recreation - all waters

Domestic, Industrial and Agricultural Water Supply - all waters

Fisheries

Trout
Little Missouri River from Narrows Dam to confluence with Muddy Fork (GC-1)

Lakes and Reservoirs - all

Streams
Seasonal Gulf Coastal fishery - all streams with watersheds of less than 10 mi² except as otherwise provided in §2.505
Perennial Gulf Coastal fishery - all streams with watersheds of 10 mi² or larger and those waters where discharges equal or exceed 1 CFS

Use Variations Supported by UAA
Loutre Creek - perennial fishery, except seasonal from railroad bridge to mouth (GC-2, #1)
Unnamed tributary to Smackover Creek - no fishable/swimmable uses (GC-2, #2)
Unnamed tributary to Flat Creek - no fishable/swimmable uses (GC-2, #4)
Dodson Creek - perennial fishery (GC-4, #5)
Jug Creek - perennial fishery (GC-2, #6)
Lick Creek - seasonal fishery; no primary contact (GC-1, #7)
Coffee Creek and Mossy Lake - no fishable/swimmable or domestic water supply uses (GC-3, #8)
Red River from Oklahoma to confluence with Little River - No domestic water supply use (GC-1, #9)
Bluff Creek and unnamed tributary - no domestic water supply use(GC-1,#10)
Mine Creek from Highway 27 to Millwood Lake - no domestic water supply use (GC-1, #11)
Caney Creek - no domestic or industrial water supply use(GC-1,#12)
Bois d'Arc Creek from Caney Creek to Red River - no domestic or industrial water supply use(GC-1,#13)
Town Creek below Acme tributary - no domestic water supply(GC-4,#14)
Unnamed trib. from Acme - no domestic water supply(GC-4,#14)
Gum Creek - no domestic water supply use(GC-2,#15)
Bayou de Loutre from Gum Creek to State line - no domestic water supply use(GC-2,#16)
Walker Branch - no domestic water supply use(GC-2,#17)
Little Cornie Bayou from Walker Branch to State line - no domestic water supply use(GC-2,#18)
Alcoa unnamed trib to Hurricane Cr.and Hurricane Cr. - no domestic water supply use(GC-4,#19)
Holly Creek - no domestic water supply use(GC-4,#20)
Dry Lost Creek and Tribs. - no domestic water supply use(GC-4.#21)
Lost Creek - no domestic water supply use(GC-4,#22)
Albemarle unnamed trib (AUT) to Horsehead Creek - no domestic water supply use(GC-2,#27)
Horsehead Creek from AUT to mouth - no domestic water supply use(GC-2,#27)

SPECIFIC STANDARDS: GULF COASTAL ECOREGION

(Plates GC-1, GC-2, GC-3, GC-4)

	Typical Streams	Spring Water Streams	Lakes and Reservoirs
Temperature* °C (°F)	30 (86)	30 (86)	32 (89.6)
Ouachita River (state line to Little Missouri River)	32 (89.6)		
Red River	32 (89.6)		
Turbidity (NTU)	21	21	25
Red River	50		
Minerals	see §2.511	see §2.511	
Dissolved Oxygen** (mg/l)	Pri. Crit.	Pri. Crit.	see §2.505
<10 mi² watershed	5 2		
10 mi² - 500 mi²	5 3		
>500 mi² watershed	5 5		
All sizes		6 5	
All other standards	(same as statewide)		

Variations Supported by UAA

Loutre Creek - from headwaters to railroad bridge, critical season D.O. standard - 3 mg/l; primary season - 5 mg/l; from railroad bridge to mouth, critical season D.O. - 2 mg/l (GC-2, #1)
Unnamed tributary to Smackover Creek - headwaters to Smackover Creek, year round D.O. criteria - 2 mg/l (GC-2, #2)
Unnamed tributary to Flat Creek - from headwaters to Flat Creek, year round D.O. criteria - 2 mg/l (GC-2, #4)
Dodson Creek - from headwaters to confluence with Saline River, critical season D.O. standard - 3 mg/l (GC-4, #5)
Jug Creek - from headwaters to confluence with Moro Creek, critical season D.O. standard - 3 mg/l (GC-2, #6)
Lick Creek - from headwaters to Millwood Reservoir, critical season D.O. standard - 2 mg/l (GC-1, #7)
Coffee Creek and Mossy Lake - exempt from §2.406 and Chapter Five (GC-3, #8)
Red River from Oklahoma to confluence with Little River - total dissolved solids - 850 mg/l (GC-1, #9)
Bluff Creek and unnamed trib. - sulfates 651 mg/l; total dissolved solids 1033 mg/l(GC-1,#10)
Muddy Fork Little Missouri River - sulfates 250 mg/l; total dissolved solids 500 mg/l(GC-1,#24)
Little Missouri River - sulfates 90 mg/l; total dissolved solids 180 mg/l(GC-1,#25)
Mine Creek from Highway 27 to Millwood Lake - chlorides - 90 mg/l; sulfates - 65 mg/l; TDS - 700 mg/l (GC-1, #11)
Caney Creek - chlorides 113 mg/l; sulfates 283 mg/l; total dissolved solids 420 mg/l(GC-1,#12)
Bois d'Arc Creek from Caney Creek to Red River - chlorides 113 mg/l; sulfates 283 mg/l; dissolved solids 420 mg/l(GC-1,#13)
Town Creek below Acme tributary - sulfates 200 mg/l; TDS 700 mg/l(GC-4,#14)
Unnamed trib. from Acme - sulfates 330 mg/l; TDS 830 mg/l(GC-4,#14)
Gum Creek - chlorides 104 mg/L; TDS 311 mg/L(GC-2,#15)
Bayou de Loutre from Gum Creek to State line - Chlorides 250 mg/l; TDS solids 750 mg/l(GC-2,#16)
Walker Branch - chlorides 180 mg/l; total dissolved solids 970 mg/l(GC-2,#17)
Ouachita River - from Ouachita River mile(ORM) 223 to the Arkansas-Louisiana border(ORM 221.1),site specific seasonal D.O.criteria: 3 mg/L June and July; 4.5 mg/L August; 5 mg/L September through May. These seasonal criteria may be unattainable during or following naturally occurring high flows,(i.e., river stage above 65 feet measured at the lower gauge at the Felsenthal Lock and Dam, Station No.89-o, and also for the two weeks following the recession of flood waters below 65 feet), which occurs from May through August. Naturally occurring conditions which fail to meet criteria should not be interpreted as violations of these criteria (GC-3,#26)
Alcoa unnamed trib. to Hurricane Cr. And Hurricane Cr. - see Sec 2.511(CG-4.#19)
Holly Creek - See Sec. 2.511(CG-4,#20)
Saline River bifurcation - see Sec. 2.511(GC-4,#23)
Dry Lost Creek and tributaries - see Sec.2.511(GC-4,#21)
Lost Creek - see Sec.2.511(GC-4,#22)
Albemarle unnamed trib (AUT) to Horsehead Creek - chlorides 137 mg/l; TDS 383 mg/l(GC-2,#27)
Horsehead Creek from AUT to mouth - chlorides 85 mg/l; TDS 260 mg/l(GC-2,#27)
Bayou Dorcheat - sulfates 16 mg/l(GC-2,#27)

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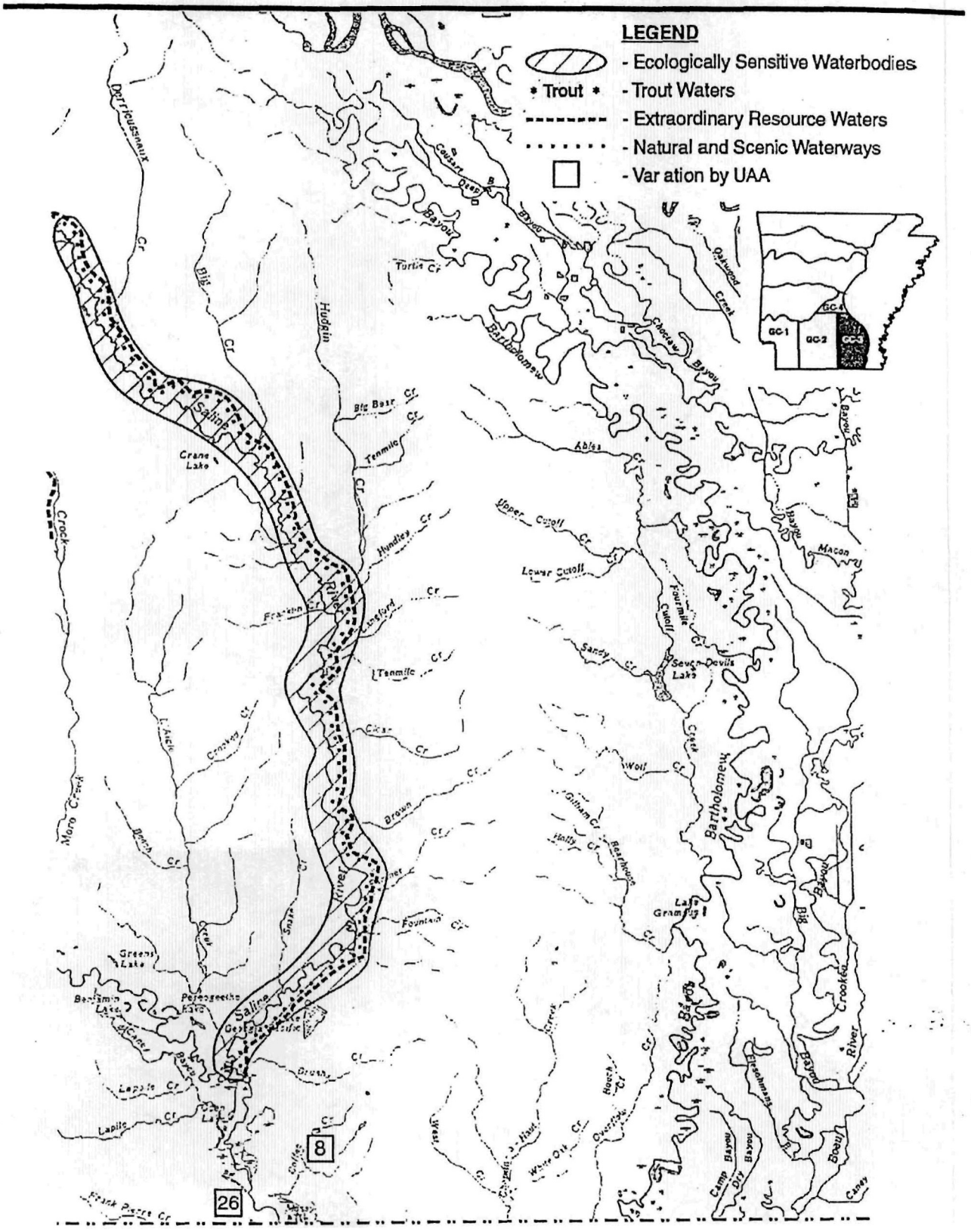
* Increase over natural temperatures may not be more than 2.8°C (5°F).

** At water temperatures ≤10°C or during March, April and May when stream flows are 15 CFS and greater, the primary season D.O. standard will be 6.5 mg/L. When water temperatures exceed 22°C, the critical season D.O. standard may be depressed by 1 mg/l for no more than 8 hours during a 24-hour period.

Plate GC-3 (Gulf Coastal Plain)



REFERENCE 7

The Department of
Arkansas
Heritage

Mike Beebe
Governor

Cathie Matthews
Director

Arkansas Arts Council

Arkansas Historic
Preservation Program

Delta Cultural Center

Historic Arkansas Museum

Mosaic Templars
Cultural Center

Old State House Museum

Arkansas Natural Heritage
Commission
1500 Tower Building
323 Center Street
Little Rock, AR 72201
(501) 324-9619
fax: (501) 324-9618
tdd: (501) 324-9811
e-mail:
arkansas@naturalheritage..org
website:
www.naturalheritage.com

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Date: August 28, 2007
Subject: Elements of Special Concern
Environmental Site Assessment
Site near Pine Bluff, AR
ANHC No.: S-ADEQ-07-105

Terry Sligh
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118

Dear Mr. Sligh:

Attached is a list of Elements of Special Concern known to occur within a fifteen-mile radius of the site near Pine Bluff in Jefferson County, Arkansas. The list has been annotated to indicate those elements falling within a one and a four mile radius of the project site. 51 occurrences have been recorded within the fifteen mile radius. An occurrence represents a location, which provides habitat for sensitive species (both state and federal species), is an outstanding example of a natural community, or is a colonial bird nesting site. A legend is provided to help you interpret the codes used on this list.

Our records indicate the following managed areas within the fifteen-mile radius:

Federal:
Pine Bluff Arsenal – Department of Defense

State:
Byrd Lake Natural Area – Arkansas Natural Heritage Commission
Taylor Woodlands Natural Area – Arkansas Natural Heritage Commission

If you have questions or need additional information, please feel free to contact me.

Sincerely,

Cindy Osborne

Cindy Osborne
Data Manager/Environmental Review Coordinator

Enclosures: Legend
Element List

Received
AUG 31 2007
07-R-43701
Hazardous Waste

LEGEND

STATUS CODES

FEDERAL STATUS CODES

C	=	Candidate species. The U.S. Fish and Wildlife Service has enough scientific information to warrant proposing this species for listing as endangered or threatened under the Endangered Species Act.
LE	=	Listed Endangered; the U.S. Fish and Wildlife Service has listed this species as endangered under the Endangered Species Act.
LT	=	Listed Threatened; the U.S. Fish and Wildlife Service has listed this species as threatened under the Endangered Species Act.
-PD	=	Proposed for Delisting; the U.S. Fish and Wildlife Service has proposed that this species be removed from the list of Endangered or Threatened Species.
PE	=	Proposed Endangered; the U.S. Fish and Wildlife Service has proposed this species for listing as endangered.
PT	=	Proposed Threatened; the U.S. Fish and Wildlife Service has proposed this species for listing as threatened.
T/SA E/SA	=	Threatened (or Endangered) because of similarity of appearance.

STATE STATUS CODES

INV	=	Inventory Element; The Arkansas Natural Heritage Commission is currently conducting active inventory work on these elements. Available data suggests these elements are of conservation concern. These elements may include outstanding examples of Natural Communities, colonial bird nesting sites, outstanding scenic and geologic features as well as plants and animals, which, according to current information, may be rare, peripheral, or of an undetermined status in the state. The ANHC is gathering detailed location information on these elements.
WAT	=	Watch List Species; The Arkansas Natural Heritage Commission is not conducting active inventory work on these species, however, available information suggests they may be of conservation concern. The ANHC is gathering general information on status and trends of these elements. An "*" indicates the status of the species will be changed to "INV" if the species is verified as occurring in the state (this typically means the agency has received a verified breeding record for the species).
MON	=	Monitored Species; The Arkansas Natural Heritage Commission is currently monitoring information on these species. These species do not have conservation concerns at present. They may be new species to the state, or species on which additional information is needed. The ANHC is gathering detailed location information on these elememts
SE	=	State Endangered; the Arkansas Natural Heritage Commission applies this term to native plant taxa which are in danger of being extirpated from the state.
ST	=	State Threatened; The Arkansas Natural Heritage Commission applies this term to native plant taxa which are believed likely to become endangered in Arkansas in the foreseeable future, based on current inventory information.

DEFINITION OF RANKS

Global Ranks

G1	=	Critically imperiled globally. At a very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2	=	Imperiled globally. At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3	=	Vulnerable globally. At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4	=	Apparently secure globally. Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5	=	Secure globally. Common, widespread and abundant.
GH	=	Of historical occurrence, possibly extinct globally. Missing; known from only historical occurrences, but still some hope of rediscovery.
GU	=	Unrankable. Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

GX = Presumed extinct globally. Not located despite intensive searches and virtually no likelihood of rediscovery.

GNR = Unranked. The global rank not yet assessed.

GNA = Not Applicable. A conservation status rank is not applicable.

T-RANKS= T subranks are given to global ranks when a subspecies, variety, or race is considered at the state level. The subrank is made up of a "T" plus a number or letter (1, 2, 3, 4, 5, H, U, X) with the same ranking rules as a full species.

State Ranks

S1 = Critically imperiled in the state due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors making it vulnerable to extirpation.

S2 = Imperiled in the state due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it vulnerable to extirpation.

S3 = Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 = Apparently secure in the state. Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 = Secure in the state. Common, widespread and abundant.

SH = Of historical occurrence, with some possibility of rediscovery. Its presence may not have been verified in the past 20-40 years. A species may be assigned this rank without the 20-40 year delay if the only known occurrences were destroyed or if it had been extensively and unsuccessfully sought.

SU = Unrankable. Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SX = Presumed extirpated from the state. Not located despite intensive searches and virtually no likelihood of rediscovery.

SNR = Unranked. The state rank not yet assessed.

SNA = Not Applicable. A conservation status rank is not applicable.

General Ranking Notes

Q = A "Q" in the global rank indicates the element's taxonomic classification as a species is a matter of conjecture among scientists.

RANGES= Ranges are used to indicate a range of uncertainty about the status of the element.

? = A question mark is used to denote an inexact numeric rank.

B = Refers to the breeding population of a species in the state.

N = Refers to the non-breeding population of a species in the state.

8/27/2007

Arkansas Natural Heritage Commission
Department of Arkansas Heritage
Inventory Research Program
Within 15-mile Radius of Pine Bluff Site

	Scientific Name	Common Name	Federal Status	State Status	Global Rank	State Rank
	Animals-Invertebrates					
	Cicindela hirticollis	Beach-dune Tiger Beetle		INV	G5	S2S3
	Fallicambarus gilpini	A crayfish			G1	S1
	Speyeria diana	Diana		INV	G3G4	S2S3
	Animals-Vertebrates					
	Etheostoma parvipinne	Goldstripe Darter		INV	G4G5	S2
	Myotis austroriparius	southeastern myotis		INV	G3G4	S3
✓	*Notropis maculatus*	Taillight Shiner		INV	G5	S3
	Pteronotropis hubbsi	Bluehead Shiner		INV	G3	S3
	Regina grahamii	Graham's Crayfish Snake		INV	G5	S2
	Sterna antillarum athalassos	Interior Least Tern	LE	INV	G4T2Q	S2B
	Plants-Vascular					
✓	*Agalinis homalantha*	San Antonio false-foxglove		INV	G5	S1
	Calopogon tuberosus var. tuberosus	tuberous grass-pink		INV	G5T5	S1
	Carex atlantica ssp. capillacea	a caric sedge		INV	G5T5?	S3
	Chamaelirium luteum	devil's bit		INV	G5	S3
	Croptilon hookerianum var. validum	scratch-daisy		INV	GNRTNR	S2
	Cypripedium kentuckiense	Kentucky lady's-slipper		INV	G3	S3
	Eleocharis flavescens	pale spike rush		INV	G5	S1S2
	Eleocharis microcarpa	a spike rush		INV	G5	S3S4
✓	*Eupatorium hyssopifolium var. hyssopifolium*	hyssop-leaved boneset		INV	G5T5	S3
✓	*Fuirena bushii*	Bush's umbrella-grass		INV	G5	S3
	Habenaria repens	water-spider orchid		INV	G5	S2
✓	*Heliotropium convolvulaceum*	phlox heliotrope		INV	G5	S2
	Leitneria floridana	corkwood		INV	G3	S3
✓	*Lycopodiella appressa*	appressed bog club-moss		INV	G5	S3
	Nemastylis geminiflora	celestial lily		INV	G4	S3
	Platanthera cristata	yellow crested-orchid		INV	G5	S1S2
	Pogonia ophioglossoides	rose pogonia		ST	G5	S2
	Prenanthes barbata	barbed rattlesnake root		INV	G3	S2
	Scleria pauciflora	fewflower nutsedge		INV	G5	S3
	Special Elements-Natural Communities					
	Lowland oak-hickory forest			INV	GNR	S1
	Lowland pine-oak forest			INV	GNR	S1

* - No elements of special concern have been recorded within one mile of the Pine Bluff site.

✓- These elements of special concern have been recorded within five miles of the Pine Bluff site.